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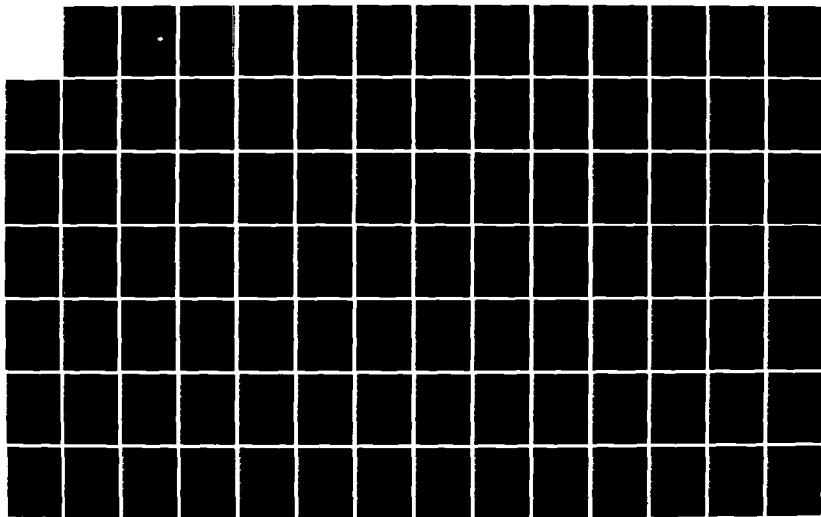
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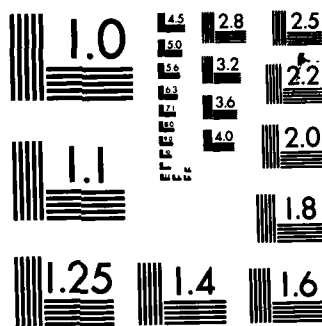
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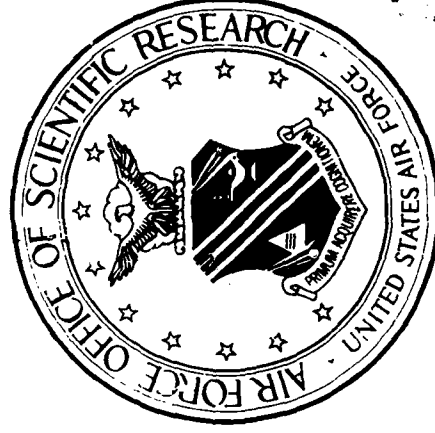
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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries are published quarterly as of March, June, September, and December of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. The summaries contain two indexes for easily locating the technical reports that may be of interest to the user. These are followed by abstracts of the reports.

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Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

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Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences

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DESCRIPTORS: (U) *MAGNETOHYDRODYNAMICS, PLASMA WAVES, BETA PARTICLES, LINEAR SYSTEMS, STABILITY

DESCRIPTORS: (U) *HEATING, *IONS, ELECTRIC CURRENT, ELECTRONS, MAGNETIC FIELDS, TEMPERATURE, RATES, LOW FREQUENCY, FREQUENCY, SATURATION, SPECTRA, ENERGY, WAVES

IDENTIFIERS: (U) WUAFOSR975103, PEG1102F

IDENTIFIERS: (U) WUAFOSR975103, PEG1102F

AD-B090 992L

AD-B090 973L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-8091 019L 20/7

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Exact Analytical Force-Free Three-Dimensional Stellarator Equilibrium.

DESCRIPTIVE NOTE: Rept. for Jun 79-Jan 80,

MAR 80 17P

PERSONAL AUTHORS: Cap.F. F. ;

REPORT NO. SCIENTIFIC-178

CONTRACT NO. F49620-80-C-0018

MONITOR: AFOSR
TR-85-0320

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Distribution: Further dissemination only as directed by Air Force Office of Scientific Research; Bolling AFB, Bldg 410, Washington, DC 20222; 8 Mar 85; or higher DoD authority. Availability: Document partially illegible.

DESCRIPTORS: (U) *STELLARATORS, THREE DIMENSIONAL, FORCE(MECHANICS), TOROIDS, EQUILIBRIUM(GENERAL), MAGNETOHDRODYNAMICS

AD-8090 998L 18/12

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Economic, Political and Environmental Aspects of Nuclear Power and Alternative Sources.

DESCRIPTIVE NOTE: Rept. for Jun-Jul 80,

AUG 80 24P

PERSONAL AUTHORS: Cap.F. ;

REPORT NO. SCIENTIFIC-188

CONTRACT NO. F49620-80-C-0018

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR
TR-85-0322

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Distribution: Further dissemination only as directed by Air Force Office of Scientific Research, Bolling AFB, Bldg. 410, Washington DC 20222, 8 Mar 85 or higher DoD authority.

DESCRIPTORS: (U) *NUCLEAR ENERGY, ENVIRONMENTAL IMPACT, ENERGY, SOURCES

IDENTIFIERS: (U) *Fusion power, PEG1102F

AD-8091 019L

AD-8090 998L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-B091 025L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Force-Free Analytical Three-dimensional Toroidal MHD-Equilibrium of Arbitrary Cross Section.

DESCRIPTIVE NOTE: Rept. for Jun 79-Jul 80.

AUG 80 21P

PERSONAL AUTHORS: Cap.F. F. ;

REPORT NO. SCIENTIFIC-185

CONTRACT NO. F49820-80-C-0018

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR
TR-85-0321

UNCLASSIFIED REPORT

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DESCRIPTORS: (U) *MAGNETOHYDRODYNAMIC GENERATORS, FREE FIELD, FOURIER SERIES, THREE DIMENSIONAL

IDENTIFIERS: (U) PE81102F, WUAFOSR975103

AD-B091 025L

UNCLASSIFIED

AD-B091 024L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Collisionless Drift Instability and Ion Heating in a Current-Carrying Inhomogeneous Plasma.

DESCRIPTIVE NOTE: Rept. for Sep 78-Jan 80.

MAR 80 35P

PERSONAL AUTHORS: Hatakeyama, R. ; Oertl, M. ; Maerk, E. ; Schrittwieser, R. ;

REPORT NO. SCIENTIFIC-175

CONTRACT NO. F49820-80-C-0018

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR
TR-85-0329

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research/NP, Bolling AFB, Bldg. 410, Washington, DC 20222, 8 Mar 85 or higher DoD Authority.

DESCRIPTORS: (U) *PLASMA WAVES, DISPERSION RELATIONS, ACOUSTIC WAVES, IONS, MAGNETIC FIELDS

IDENTIFIERS: (U) Drift instability, Ion heating, PE81102F, WUAFOSR975103

AD-B091 024L

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SEARCH CONTROL NO. EVLOSA

AD-B091 043L 20/8

AD-B091 041L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Beam Stabilization of the Current Driven Ion Acoustic Instability.

(U) Investigations on Plasma Instabilities.

DESCRIPTIVE NOTE: Rept. for May 78-Sep 79.

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-15 Nov 80.

NOV 79 17P

NOV 80 20P

PERSONAL AUTHORS: Cap.F. ;Krlin.L. ;Maerk.E. ;Popa.G. ;
Schriftwieser,R. ;

PERSONAL AUTHORS: Cap.F. ;

REPORT NO. SCIENTIFIC-189

CONTRACT NO. F49620-80-C-0016

CONTRACT NO. F49620-80-C-0016

PROJECT NO. 9751

PROJECT NO. 9751

TASK NO. 03

TASK NO. 03

MONITOR: AFOSR
TR-85-0312

MONITOR: AFOSR
TR-85-0326

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authority.

DESCRIPTORS: (U) *ION BEAMS, STABILIZATION, ACOUSTICS

DESCRIPTORS: (U) *PLASMA OSCILLATIONS, PLASMA CONTROL,
HEATING, HANDBOOKS

IDENTIFIERS: (U) Q machines, WUAFOSR975103, PEB1102F

IDENTIFIERS: (U) *Plasma instabilities, WUAFOSR975103,
PEB1102F

AD-B091 043L

AD-B091 041L

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SEARCH CONTROL NO. EVLO5A

AD-8091 054L 20/9

AD-8091 044L 20/8 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Stability Domains of Ballooning Modes in Toroidal Plasmas.

(U) Coherent Wave-Particle Interaction in a Q-Machine Plasma.

DESCRIPTIVE NOTE: Rept. for Jun 79-Sep 80.

DESCRIPTIVE NOTE: Rept. for Dec 79-Jan 80.

OCT 80 18P

FEB 80 9P

PERSONAL AUTHORS: Cap, F. F. ;

PERSONAL AUTHORS: Oertl, M. ; Maerk, E. ; Schrittwieser, R. ;

REPORT NO. SCIENTIFIC-189

REPORT NO. SCIENTIFIC-174

CONTRACT NO. F44620-75-C-0006

CONTRACT NO. F49620-90-C-0016

PROJECT NO. 9751

PROJECT NO. 9751

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MONITOR: AFOSR
TR-85-0318MONITOR: AFOSR
TR-85-0319

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DESCRIPTORS: (U) *PLASMA WAVES, PRESSURE GRADIENTS, FIELD INTENSITY, MAGNETIC FIELDS, DOMAIN WALLS, STABILITY, TOROIDS

DESCRIPTORS: (U) *PLASMA DEVICES, *INTERACTIONS, *PARTICLES, *PLASMA WAVES, EXCITATION, AMPLITUDE, COHERENCE, GRIDS, NONLINEAR SYSTEMS, WAVES

IDENTIFIERS: (U) Ballooning instabilities, PE81102F, WIAFOSR975103

IDENTIFIERS: (U) Q machines, ion waves, WUAFOSR975103, PE81102F

AD-8091 054L

AD-8091 044L

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AD-B091 056L 3/2 20/9 12/1

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Temperature Anisotropy Instabilities.

DESCRIPTIVE NOTE: Rept. for Mar-Oct 79.

NOV 79 19P

PERSONAL AUTHORS: Leubner, M. ;

REPORT NO. SCIENTIFIC-170

CONTRACT NO. F49620-80-C-0018

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR
TR-85-0313

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research/NA, Bolling AFB, Bldg. 410, Washington, DC 20222, 8 Mar 85 or higher DoD Authority.

DESCRIPTORS: (U) *SOLAR WIND, *THERMAL INSTABILITY, *DISTRIBUTION FUNCTIONS, *ANISOTROPY, IONS, CYCLOTRONS, VELOCITY, LINEARITY, DISPERSION RELATIONS, PROTONS, DISTRIBUTION, GROWTH(GENERAL), INTERPLANETARY SPACE, OUTER SPACE

AD-B091 056L

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AD-B091 055L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) On the Collapse of Longitudinal Waves in a Plasma.

DESCRIPTIVE NOTE: Rept. for Oct 79-Jan 80.

MAR 80 12P

PERSONAL AUTHORS: Tskhakala, D. ;

REPORT NO. SCIENTIFIC-178

CONTRACT NO. F49620-80-C-0018

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR
TR-85-0325

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research/NP, Bolling AFB, Bldg. 410, Washington, DC 20222, 8 Mar 85 or higher DoD Authority.

DESCRIPTORS: (U) *PLASMA WAVES, ENERGY CONSERVATION, ELECTROSTATICS, ELECTROMAGNETIC RADIATION, INTERACTIONS

AD-B091 055L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-B091 062L 20/9

AD-B091 061L 12/1 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Three-Dimensional Analytical Solutions of Toroidal Plasma Equilibria.

(U) Steady-State Parameters and Buneman Instability in a Collisionless Single-Ended Q-Machine.

DESCRIPTIVE NOTE: Scientific rept. Jun 78-Jul 80,

DESCRIPTIVE NOTE: Scientific rept. Jun 79-Jan 80.

SEP 80 16P

MAY 80 8P

PERSONAL AUTHORS: Cap. F. F. ;

PERSONAL AUTHORS: Kuhn, S. ;

REPORT NO. SR-188

REPORT NO. SR-181

CONTRACT NO. F44620-75-C-0006

CONTRACT NO. F49620-80-C-0016

PROJECT NO. 9751

PROJECT NO. 9751

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TASK NO. 03

MONITOR: AFOSR
TR-85-0317MONITOR: AFOSR
TR-85-0323

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Distribution: Further dissemination only as directed by the Air Force Office of Scientific Research, Attn: NP. Bolling AFB, Bldg. 410. Washington, DC 20222, 8 Mar 85, or higher DoD authority.

DESCRIPTORS: (U) *PLASMA WAVES, *TOROIDS, PRESSURE GRADIENTS, CARTESIAN COORDINATES, MAGNETIC FIELDS, THREE DIMENSIONAL, MAGNETOHYDRODYNAMICS, COMPRESSIBLE FLOW, ISOTHERMS

DESCRIPTORS: (U) *PLASMA DEVICES, *MATHEMATICAL MODELS, COMPUTATIONS, LINEAR SYSTEMS, BIAS, EQUATIONS, NEUTRALIZATION, PARAMETERS, STEADY STATE

IDENTIFIERS: (U) PE61102F, WJAFOSR975103

IDENTIFIERS: (U) *Q machines, Buneman instability, PE61102F, WJAFOSR975103

AD-B091 062L

AD-B091 061L

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AD-B091 093L 18/3 8/11 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A
WOODWARD-CLYDE CONSULTANTS PASADENA CA AD-B091 093L CONTINUED

(U) Estimating Seismic Yield, pp Parameters and Tectonic Release Characteristics at the Novaya Zemlya Test Site. PROCESSING, *SEISMIC WAVES, NUCLEAR EXPLOSION TESTING, UNDERGROUND EXPLOSIONS, CORRELATION, USSR, RELEASE, TECTONICS

DESCRIPTIVE NOTE: Final technical rept. 15 Nov 83-14 Nov 84. IDENTIFIERS: (U) Novaya Zemlya, Body waves, Intercorrelation, pp waves, Tectonic release

JAN 85 148P

PERSONAL AUTHORS: Burger, R. W.; Lay, T.; Arvesen, C. G.; Burdick, L. J.

REPORT NO. WCCP-R-85-03

CONTRACT NO. F49620-83-C-0028, ARPA Order-4892

MONITOR: AFOSR
TR-85-0485

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; 2 May 85. Other requests must be referred to DARPA/TID, Arlington, VA 22209.

ABSTRACT: (U) A new method for estimating the yield of nuclear tests from short-period body waves has been applied to data from the Novaya Zemlys test sites. The method, which is called Intercorrelation, takes advantage of all the information in the signal rather than a simple amplitude to period ratio as m sub b does. The Intercorrelation technique explicitly accounts for path and receiver effects by analytically comparing signals from a test site with other signals from the test site at the same station. Since the paths are identical, the differences in signals must be primarily due to changes in the character of the explosion source. The method automatically gives estimates of variations in the source time functions and in the pp arrival. The method provides a means to define a distinct test site in a quantitative way. This is a site in which all tests can be legitimately compared to each other in terms of yield and seismic signal. The physics of seismic wave generation and propagation to the monitoring network is different in some substantial way between the Northern and Southern Novaya Zemlya test sites.

DESCRIPTORS: (U) *YIELD/NUCLEAR EXPLOSIONS1, *SIGNAL

AD-B091 093L

AD-B091 083L

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- *VASQUEZ, S. A. * * *
Fundamental Study of Three Dimensional Two Phase Flow in Combustion Systems.
AD-A150 739
- *VENKATAPATHY, E. * * *
Forebody and Baseflow of a Dragbrake OTV (Orbital Transfer Vehicle) by an Extremely Fast Single Level Implicit Algorithm.
AD-A150 932
- *VERDIECK, J. F. * * *
Resonant CARS Detection of OH radicals.
AD-A153 842
- *VICK, S. C. * * *
Silacyclopropenes. 2. 'Two-Atom' Insertion Reactions of 1,1-Dimethyl-2,3-bis(trimethylsilyl)silirene.
AD-A151 265
- Silacyclopropenes. 3. Palladium-Catalyzed Insertion Reactions.
AD-A152 682
- *WAGNER, H. G. * * *
Initiation, Stability and Limits of Detonation for Advanced Stable

PERSONAL AUTHOR INDEX-28
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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-B090 439L 9/2 20/8
HUGHES RESEARCH LABS MALIBU CA

(U) Real-Time Implementation of Nonlinear Optical Processing Functions.

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 81-15 Jun 84.

AUG 84 199P

PERSONAL AUTHORS: Soffer, B. H. ;

CONTRACT NO. F49620-81-C-0088

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR
TR-85-0243

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; 21 Feb 85. Other requests must be referred to Air Force Office of Scientific Research, Attn: XOTD, Building 410, Bolling AFB, DC 20332.

ABSTRACT: (U) Optical data processing has not yet achieved its potential of increased capacity and speed compared with conventional electronic techniques, primarily for lack of a practical real-time image modulator, and because optical techniques have been almost exclusively limited to linear operations. The continuing research outlined in this report attacks these issues by studying the implementation of real-time nonlinear parallel-processing techniques. The various implementations studied in this program all employed real-time liquid-crystal light valves. Additional key words include: Variable grating mode; Dynamic response; Parallel processing; Optical signal processing; and Optical data processing.

DESCRIPTORS: (U) *DATA PROCESSING, *REAL TIME, *OPTICAL PROCESSING, OPTICAL DATA, DYNAMIC RESPONSE, NONLINEAR SYSTEMS, SIGNAL PROCESSING, PARALLEL PROCESSING, LIQUID CRYSTALS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2305B1

AD-B090 439L

AD-B090 396L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Investigation of Plasma Instabilities.

DESCRIPTIVE NOTE: Technical rept. Nov 80-May 81.

JUN 81 130P

PERSONAL AUTHORS: Cap.F. ;

CONTRACT NO. F49620-80-C-0016

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0133

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; 7 Feb 85. Other requests must be referred to Office of Scientific Research, ATTN: XOTD, Building 410, Bolling AFB, DC 20332.

ABSTRACT: (U) This report summarizes four research reports on trapped and blocked particle instabilities and force-free three dimensional toroidal equilibria published during this contract period. The details of these reports can be found in Dr. Cap's book, 'Handbook of Plasma Instabilities'.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), PARTICLES, EQUILIBRIUM(GENERAL), TRAPPING(CHARGED PARTICLES), BLOCKING, STABILITY

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A7

AD-B090 396L

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-B089 747L 17/7

CHARLES STARK DRAPER LAB INC CAMBRIDGE MA

(U) Optical Gyro Error and Performance Modeling.

DESCRIPTIVE NOTE: Final rept. 1 Dec 82-1 Dec 83.

NOV 83 89P

PERSONAL AUTHORS: Coccioni, J. D. ; Feldman, J. ;

REPORT NO. CSDL-C-5748

CONTRACT NO. F49620-82-C-0006

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR
TR-85-0093

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; 27 Feb 85. Other requests must be referred to Air Force Office of Scientific Research, Dept. of the Air Force, Bolling AFB, DC 20332.

ABSTRACT: (U) This is the final annual report on passive optical gyro error and performance modeling. A description is given of several closed-loop baseline mechanizations of interferometer and resonator types of optical gyros. These mechanizations are intended to represent the state of the art. They are used as a basis to discuss error and performance issues. Additional keywords: Air Force research, Fiber optics, Interferometers, State of the Art. (Author)

DESCRIPTORS: (U) *GYROSCOPES, RESONATORS, PERFORMANCE(ENGINEERING), OPTICAL EQUIPMENT, ERRORS, PASSIVE SYSTEMS, INTERFEROMETERS

IDENTIFIERS: (U) Optical gyroscopes, WUAFOSR2305B2, PE81102F

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AD-B089 727L 11/2 20/6

CORNING GLASS WORKS NY

(U) Fluoride Glasses for Bulk Optical and Waveguide Applications.

DESCRIPTIVE NOTE: Final rept. 15 Apr 83-14 Apr 84.

AUG 84 18P

PERSONAL AUTHORS: Tick, P. ; Thompson, D. ; Quan, F. ;

CONTRACT NO. F49620-83-C-0090

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-84-1134

UNCLASSIFIED REPORT

Distribution limited to DoD only; Critical Technology; 10 Jan 85. Other requests must be referred to Air Force Office of Scientific Research/XOT, Building 410, Bolling AFB, DC 20332.

ABSTRACT: (U) The principal objective of our research is to evaluate fluoride glasses for high optical transparency applications. Compatibility with a unique fabrication process of chemical vapor deposition will be a selection criteria. Fluoride glasses have a number of potentially useful characteristics such as extended spectral windows and ultra low theoretical attenuations. In order to exploit these characteristics, and fully define intrinsic optical and physical properties, it is necessary to fabricate very pure and homogeneous material. The most direct method of attaining the purification necessary to achieve ultra low loss optical waveguides is by chemical vapor deposition (CVD) of the core glass. This technology is well developed in silicate systems, but only in its early infancy in the class of infrared transmitting materials known as heavy metal fluoride glasses (HMFG). A new glass system was found which meets the minimum CVD requirements. This system is based upon CdF2-LiF-AlF3-PbF2 and is given the acronym CLAP glasses.

DESCRIPTORS: (U) *OPTICAL WAVEGUIDES, *GLASS, *FLUORIDES, LOW LOSS, INFRARED OPTICAL MATERIALS, BULK MATERIALS.

AD-B089 727L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-B089 727L CONTINUED

VAPOR DEPOSITION

IDENTIFIERS: (U) *Fluoride glasses. WUAFDSR2303A3,
PE61102F

AD-A153 980 20/9

POLYTECHNIC INST OF NEW YORK FARMINGDALE DEPT OF
ELECTRICAL ENGINEERING

(U) Millimeter Wave Generation by Relativistic Electron
Beams.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 83-30 Sep 84,

DEC 84 131P

PERSONAL AUTHORS: Kuo, S. P.; Cheo, B. R.;

REPORT NO. POLY-84-007

CONTRACT NO. AFOSR-83-0001

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-85-0342

UNCLASSIFIED REPORT

ABSTRACT: (U) We are studying various wave-plasma interaction processes towards the understanding of the collective physics of plasmas. The processes include the mechanisms leading to the generation of millimeter waves by relativistic electron beams (electron cyclotron maser instability) and the mechanisms providing channels for anomalous absorption of electromagnetic waves (electron cyclotron resonance heating and parametric instabilities). A single nonlinear equation which describes the temporal evolution of the field amplitude of the electron cyclotron maser instability has been derived self-consistently. Three adiabatic invariants of the electron motion under the electron cyclotron resonance heating by three differently polarized heater: (1) ordinary mode; (2) extraordinary mode; and (3) electrostatic mode are derived. Wave plasma interaction leading to various parametric instabilities in the ionosphere has also been studied. Keywords include: Millimeter wave generation, Relativistic electron beams, Wave-plasma interaction, Electron cyclotron maser instability, ECRH, and Parametric instabilities.

DESCRIPTORS: (U) *ELECTRON BEAMS, *PLASMA WAVES,
ABSORPTION, AMPLITUDE, ANOMALIES, CYCLOTRON RESONANCE,

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CYCLOTRONS, ELECTROMAGNETIC RADIATION, ELECTROSTATICS,
EQUATIONS, HEATERS, HEATING, INTERACTIONS, MASERS,
MILLIMETER WAVES, NONLINEAR SYSTEMS, PARAMETRIC
INSTABILITIES, PLASMAS(PHYSICS), POLARIZATION, RELATIVITY
THEORY, STABILITY, WAVE PROPAGATION

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Vibrational State Selection of Ammonia Ions Using
Resonant 2 + 1 Multiphoton Ionization,

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A8

FEB 85 8P

PERSONAL AUTHORS: Conaway, W. E.; Morrison, R. J. S.; Zare,
R. N.;

CONTRACT NO. F49620-83-C-0033

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-85-0406

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters,
v113 n5 p429-434, 1 Feb 85.

ABSTRACT: (U) Photoelectron kinetic energy spectra are
presented for the 2 + 1 multiphoton ionization of NH3 via
the vibronic levels of the B and C' Rydberg states of the
neutral. The contribution from delta v= 0 state-selected
ionization is greater than 80% through the C' state and
over 70% through the B state. This allows for the
production of large densities of NH3(+) ions with a high
degree of vibrational selectivity.

DESCRIPTORS: (U) *AMMONIA, *IONS, *VIBRATIONAL SPECTRA,
DENSITY, KINETIC ENERGY, PHOTOELECTRON SPECTRA,
PRODUCTION, SELECTION, VIBRATION, ENERGY LEVELS,
IONIZATION, ELECTRONIC STATES

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303B1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A153 962 20/8 20/5

SRI INTERNATIONAL MENLO PARK CA ARTIFICIAL INTELLIGENCE CENTER

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Semantical Considerations on Nonmonotonic Logic.

85 21P

84 8P

PERSONAL AUTHORS: Moore, R. C. ;

PERSONAL AUTHORS: Smith, B. W. ; Dmenetto, N. ; Winefordner, J. D. ;

CONTRACT NO. F49620-82-K-0031

CONTRACT NO. F49620-84-C-0002

PROJECT NO. 2304

PROJECT NO. 2303

TASK NO. A7

TASK NO. A1

MONITOR: AFOSR

TR-85-0407

MONITOR: AFOSR

TR-85-0411

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Artificial Intelligence, v25 p75-94 1985;

SUPPLEMENTARY NOTE: Pub. in Spectrochimica Acta B, v39B n9-11 p1389-1393 1984.

ABSTRACT: (U) Commonsense reasoning is 'nonmonotonic' in the sense that we often draw, on the basis of partial information, conclusions that we later retract when we are given more complete information. Some of the most interesting products of recent attempts to formalize nonmonotonic reasoning are the nonmonotonic logics of McDermott and Doyle. These logics, however, all have peculiarities that suggest they do not quite succeed in capturing the intuitions that prompted their development. In this paper we reconstruct nonmonotonic logic as a model of an ideally rational agent's reasoning about his own beliefs. For the resulting system, called autiepistemic logic, we define an intuitively based semantics for which we can show autiepistemic logic to be both sound and complete. We then compare autiepistemic logic with the approach of McDermott and Doyle, showing how it avoids the peculiarities of their nonmonotonic logic. Additional keywords: Reprints. (Author)

DESCRIPTORS: (U) *SEMANTICS, LOGIC, REASONING, REPRINTS

IDENTIFIERS: (U) Nonmonotonic logic, PE61102F, WUAFOSR2304A7

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DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *GLOW DISCHARGES, ATOMS, CATHODES, CELLS, COPPER, DARKNESS, DEPOSITION, DETECTION, DYE LASERS, ELECTRODES, FREQUENCY MULTIPLIERS, GRAPHITE, LASERS, LIMITATIONS, PULSES, SOLUTIONS(MIXTURES), SURFACES, WATER, REPRINTS

ABSTRACT: (U) A pulsed demountable glow discharge has been used as an atom cell for laser excited atomic fluorescence. Lead atoms are sputtered from the surface of copper and graphite cathodes and are excited by a pulsed frequency-doubled dye laser after the discharge is switched off. The combination of a 'dark' atom cell with non-resonance atomic fluorescence leads to a very low background signal. The detection limit for lead is 0.1 micro g/g and for lead in aqueous solutions (5 micro l) deposited on graphite electrodes is 20 pg. Keywords include: Atomic fluorescence, Glow discharge, Laser, and Lead.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A153 951 CONTINUED

TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES

measurements. Laser diagnostics. Alkali oven, and Superelectric plasma heating.

(U) The Application of Laser Resonance Saturation to the Development of Efficient Short Wavelength Lasers.

DESCRIPTORS: (U) *ULTRAVIOLET LASERS, *PULSED LASERS, ALKALI METAL COMPOUNDS, ATOMS, COLLISIONS, COMPUTERIZED SIMULATION, COUPLING(INTERACTION), DENSITY, DIAGNOSIS(GENERAL), ELASTIC PROPERTIES, ELECTRON DENSITY, ELECTRON TRANSITIONS, ELECTRONS, ENERGY, FREE ELECTRONS, HEATING, IONIZATION, LASERS, MEASUREMENT, NUCLEAR RESONANCE, OVENS, PHOTONS, PLASMAS(PHYSICS), RESONANCE, SATURATION, SODIUM, SPECTROSCOPY, TEMPERATURE

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 79-31 Oct 84.

OCT 84 84P

PERSONAL AUTHORS: Measures, R. M. ;

IDENTIFIERS: (U) PE61102F, WJAFOSR2301A8

CONTRACT NO. AFOSR-80-0057

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-85-037B

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser saturation of an atomic resonance transition represents an important new mode of coupling laser energy into a gas or plasma. The basic mechanism in either case is superelastic collisional heating of free electrons. For a gas various seed ionization processes precede this interaction. During the past year we have developed a computational code for mapping the three dimensional nature of this interaction. This is required because this strong interaction invariably distorts and attenuates the laser pulse as it propagates through the medium being excited. We have also developed a new experimental facility for studying this interaction and have recently completed our first spectroscopic measurements of the electron temperature produced in a sodium plasma created through laser resonance saturation. This temperature appears to be somewhat lower than predicted by our computer simulation and we are currently attempting to reconcile this difference. Also within the past year we have discovered that attenuation of the laser pulse is a maximum when the laser is detuned by about 0.5 nm from either of the resonance lines. Keywords include: XUV-ray lasers, Sodium plasma, Laser resonance saturation, Laser ionization, Electron temperature measurement, Stark broadening, Electron density measurements, Three photon saturation, Atom density

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RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Electric Microfield Distributions in Multicomponent Plasmas.

OCT 84 6P

PERSONAL AUTHORS: Iglesias, C. A.; Lebowitz, J. L.; Livermore, L. J.

CONTRACT NO. W-7405-eng-48, AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0359

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v30 n4
p2001-2004 Oct 84.

ABSTRACT: (U) We evaluate the electric microfield distribution in a multicomponent plasma (MCP). The method employed is an adaptation of the very simple adjustable-parameter exponential approximation previously developed for one-component plasmas (OCP). We also discuss a still simpler approximation in which the MCP is replaced by an effective OCP. The results are generally close to each other and the former is in very good agreement with computer simulations. Keywords include: Microfield distributions; Multicomponent plasma; Exponential approximation; and Computer simulations.

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, *ELECTRIC FIELDS, *PLASMAS(PHYSICS), COMPUTERIZED SIMULATION, APPROXIMATION(MATHEMATICS), EXPONENTIAL FUNCTIONS, REPRINTS

IDENTIFIERS: (U) *Electric microfield, WUAFOSR2301A3, PE61102F

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AD-A153 932 12/1

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Monte Carlo Simulation of Hard Spheroids,

MAR 84 5P

PERSONAL AUTHORS: Perram, J. W.; Wertheim, M. S.; Lebowitz, J. L.; Williams, G. O.

CONTRACT NO. DE-AC02-76ER03077, AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0380

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v105 n3 p277-280, 16 Mar 84.

ABSTRACT: (U) We present Monte Carlo simulations of the equation of state and radial distribution function for a mode fluid composed of hard spheroids. Keywords include: Hard spheroids; Monte Carlo Simulations; Equation of state; and Radial distribution function.

DESCRIPTORS: (U) *MONTE CARLO METHOD, DISTRIBUTION FUNCTIONS, EQUATIONS OF STATE, FLUIDS, HARDENING, RADIUS(MEASURE), SIMULATION, SPHERES, REPRINTS

IDENTIFIERS: (U) Hard spheroids, WUAFOSR2301A3, PE61102F

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DTIC REPORT BIBLIOGRAPHY

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AD-A153 919 12/1 17/2

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) On Potential and Field Fluctuations in Classical Charged Systems.

(U) High Performance Asynchronous Limited Sensing Algorithms for CSMA and CSMA-CD Channels.

84 27P

DESCRIPTIVE NOTE: Technical rept.,

PERSONAL AUTHORS: Lebowitz, J. L.; Martin, P. A.;

MAR 85 44P

CONTRACT NO. AFOSR-82-0016

PERSONAL AUTHORS: Georgiopoulos, M.; Merakos, L.; Papantoni-Kazakos, P.;

PROJECT NO. 2301

REPORT NO. UCT/DEECS/TR-85-2

TASK NO. A3

MONITOR: AFOSR TR-85-0355

CONTRACT NO. AFOSR-83-0229

PROJECT NO. 2304

UNCLASSIFIED REPORT

TASK NO. A5

SUPPLEMENTARY NOTE: Pub. in Jnl. of Statistical Physics, v34 nos1/2 p287-311 1984.

MONITOR: AFOSR TR-85-0398

ABSTRACT: (U) Using electrostatic identifies the potential and microfield in a plasma, important for determining line shapes, are expressed as limits of local quantities. These are shown to be well defined for typical configurations of macroscopic, i.e., infinite systems (under some mild clustering assumptions). Their covariance contains a slowly decaying part, (for the potential) whose coefficient is universal whenever the Stillinger-Lovett second moment condition holds. We show further that the contributions from distance regions which are equal to suitable averages over local regions have a Gaussian distribution. Keywords include: Coulomb systems; potential fluctuations; microfield distribution; particle correlations; sum rules; clustering.

DESCRIPTORS: (U) *POTENTIAL THEORY, *FIELD THEORY, CLUSTERING, CORRELATION, PARTICLES, QUANTITY, RANGE(DISTANCE), REGIONS, SHAPE, REPRINTS

IDENTIFIERS: (U) Sun rules, PEB1102F, WJAFOSR2301A3

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider the random multiple access of a collision-type, packet-switched channel, for the Poisson user model in a local area network environment, where 'carrier sensing' techniques are possible due to small propagation delays. We propose and analyze asynchronous (unslopped) random access algorithms that belong to a recently emerged class of random-access algorithms, called 'limited channel sensing' algorithms. Utilizing the regenerative character of the stochastic processes that are associated with the random access system, we derive lower bounds on the maximum access throughput, and tight upper and lower bounds on the induced mean packet delay. The proposed algorithms are inherently stable, they combine good performance with modest channel sensing requirements, and they outperform their synchronous counterparts in some Ethernet and mobile radio environments.

DESCRIPTORS: (U) *ALGORITHMS, *COMMUNICATIONS NETWORKS, CHANNELS, DETECTION, ENVIRONMENTS, LIMITATIONS, MODELS, MULTIPLE ACCESS, NETWORKS, REQUIREMENTS, STABILITY, STOCHASTIC PROCESSES, THROUGHPUT, USER NEEDS

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IDENTIFIERS: (U) *Package switching, Local area networks,
PE81102F, WJAFOSR2304A5

SOUTHWEST RESEARCH INST SAN ANTONIO TX

(U) Study of the Influence of Metallurgical Factors on
Fatigue and Fracture of Aerospace Structural Materials.

DESCRIPTIVE NOTE: Annual Scientific rept.,

FEB 85 48P

PERSONAL AUTHORS: Lankford, J. ; Davidson, D. L. ; Leverant, G.
R. ; Chan, K. S. ;

REPORT NO. SWRI-7438

CONTRACT NO. F49820-83-C-0054

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0372

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results of a study involving: (1) experimental characterization and analytical modeling of fatigue crack tip micromechanics in aerospace structural (aluminum and titanium) alloys; and (2) identifying and modeling key factors controlling subcritical crack growth and unstable fracture in single crystal nickel-base superalloys. The first section summarizes studies in which measured crack tip parameters and microstructural characterization are incorporated into a recently developed crack tip geometric model which interrelates microstructure with fatigue crack growth. The model is used with 7075-T651 Al, 7091 P/M Al, and Ti-6Al-4V to predict crack growth increments (striation spacings), which are then compared with experimental measurements for the Al alloys. Additional crack tip characterization was performed on an experimental high temperature aluminum alloy (HTAL). By using a recently developed SEM high temperature cycling stage, crack tip yielding and extension was characterized at 315 C, which showed that the interfaces of certain microstructural elements unique to the HTAL alloy were detrimental to its resistance to elevated temperature fatigue crack growth. The second section describes results of ambient temperature crack growth tests of single crystal Mar-M200.

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Tests were carried out as functions of stress intensity range, normal stress to shear stress ratio, and crystallographic orientation, and their effect on mode of cracking and crack growth characteristics was established. Additional keywords: Crack tip plasticity; Crack growth modeling; Crystallographic orientation.

DESCRIPTORS: (U) *CRACK PROPAGATION, *FRACTURE(MECHANICS), *FATIGUE(MECHANICS), ALUMINUM, ALUMINUM ALLOYS, CRACKS, CRYSTALS, FRONT ENDS AND SURFACES, GEOMETRIC FORMS, HIGH TEMPERATURE, MATHEMATICAL MODELS, MECHANICS, METALLURGY, MODELS, NICKEL ALLOYS, ORIENTATION(DIRECTION), PARAMETERS, PLASTIC PROPERTIES, RANGE(EXTREMES), RATIOS, SHEAR STRESSES, SINGLE CRYSTALS, STRESS CONCENTRATION, SUBCRITICAL ASSEMBLIES, SUPERALLOYS, TITANIUM, STRUCTURAL MEMBERS, MICROSTRUCTURE, MATHEMATICAL MODELS, STRIATIONS

IDENTIFIERS: (U) Aluminum alloy 7075-T651, Aluminum alloy -7091, Titanium alloy-6Al-4V, Crack tip plasticity, Crystallographic orientation, WUAFOSR2308A1, PE61102F

AD-A153 912 7/4

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Cage Effect in the Dissociation of van der Waals Complexes RgI2(Rg=Ar,Kr,Xe). A Quasiclassical Trajectory Study.

DEC 84 11P

PERSONAL AUTHORS: NoorBatcha,I. ;Raff,L. M. ;Thompson,D. L. ;

CONTRACT NO. AFOSR-82-0311

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0414

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Journal of Chemical Physics, v81 n12 pt1 p5658-5665, 15 Dec 84.

ABSTRACT: (U) This dissociation dynamics of the RgI2(Rg = Ar,Kr,Xe) van der Waals complexes have been studied using three-dimensional quasiclassical trajectories. Specifically, the unimolecular dissociation of RgI2(B superscript 3 pi) with initial I2 vibrational excitation above the Rg+I dissociation limit of the B superscript 3 pi state was studied. In addition to complete dissociation to atoms, iodine recombination was observed to be a major reaction channel. This results is interpreted as a cage-like effect due to the inert gas atom, which also carries away a large fraction of the energy when the complex dissociates to form I2. The reaction mechanism leading to the formation of molecular products has been found to involve both direct and long-lived, complex trajectories. Dissociation of the complex RgI2 is favored by near collinear orientations. The decomposition kinetics of the complex are found to be complex and non-RRKM in character. A four-step reaction mechanism involving an explicit intramolecular energy transfer step is proposed to explain the calculated time dependence of the product concentrations. The calculated product vibrational distributions are in qualitative agreement with the experimental results.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A153 912 CONTINUED

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DESCRIPTORS: (U) *CHEMICAL DISSOCIATION, *COMPLEX COMPOUNDS, *REACTION KINETICS, *MOLECULAR ASSOCIATION, ATOMS, CHANNELS, DECOMPOSITION, DISSOCIATION, DISTRIBUTION, DYNAMICS, ENERGY TRANSFER, IODINE, KINETICS, LIMITATIONS, LONG LIFE, MOLECULAR PROPERTIES, MOLECULES, QUALITATIVE ANALYSIS, RARE GASES, RESPONSE, TIME DEPENDENCE, TRAJECTORIES, VIBRATION, REPRINTS

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Spherical Reference Systems for Nonspherical Hard Interactions,

84 6P

IDENTIFIERS: (U) Vander Waals Forces, WUAFOSR2303A2, PE61102F

PERSONAL AUTHORS: Williams, G. O.; Lebowitz, J. L.; Percus, J. K.

CONTRACT NO. AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0353

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v88 n26 p6488-6489 1984.

ABSTRACT: (U) We investigate the applicability of the median and Barker-Henderson prescriptions for obtaining spherical reference systems for three models: hard linear triatomics, hard heteronuclear dumbbells, and two-component mixtures of hard dumbbells. We propose an empirical method for determining the median potential for systems lacking a high degree of symmetry. For mixtures of hard molecules, we find that both the median and Barker-Henderson prescriptions give rise to approximately additive hard-sphere reference potentials. Keywords include: Nonspherical molecules; hard triatomics, dumbbells, mixtures; nonsymmetric median potential, equation of state.

DESCRIPTORS: (U) *EQUATIONS OF STATE, *MOLECULE MOLECULE INTERACTIONS, MIXTURES, SYMMETRY, HARDNESS, POLYATOMIC MOLECULES, POTENTIAL ENERGY, REPRINTS

IDENTIFIERS: (U) Nonspherical molecules, Triatomic molecules, Dumbbells, WUAFOSR2301A3, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A153 888

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AD-A153 888 CONTINUED

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS

(U) New Systematic Expansion of the Electric Field
Distribution in Plasmas.

NOV 84 13P

PERSONAL AUTHORS: Alastuey, A.; Iglesias, C. A.; Lebowitz, J.
L.; Levesque, D.

CONTRACT NO. AFOSR-82-0018

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0361

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v30 n5
p2537-2547 Nov 84.

ABSTRACT: (U) We derive a new systematic expansion of the electric field distribution at a test charge immersed in an infinite two- or three-dimensional one-component plasma. The lowest-order truncation of this expansion leads to a mean-field theory very similar to the adjustable-parameter exponential approximation (APEX). The next-order corrections to this mean-field theory are explicitly computed in terms of the distribution functions of the plasma particles. All the approximations are compared to the Monte Carlo results for a two-dimensional system at $P=2$ and various test charges. The systematic approximations appear to be useful. Even the zeroth-order approximation is quite accurate for large test charges or strongly coupled systems and the next order improves on it. Still, APEX is found to be most reliable (as it is also in three dimensions) and remains accurate in the practical interesting limit where the test charge vanishes, i.e., at a neutral atom. Keywords include: Plasmas; electric field distribution; systematic expansion; exponential approximation; corrections; Monte Carlo simulation.

DESCRIPTORS: (U) *ELECTRIC FIELDS, *PLASMASPHERE,
APPROXIMATION(MATHEMATICS), ATOMS, COUPLING(INTERACTION).

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A153 887 12/1

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) On MGR (Upsilon) Multigrid Methods.

DESCRIPTIVE NOTE: Technical rept..

JAN 85 38P

PERSONAL AUTHORS: Kamowitz, D.; Parter, S. V. ;

REPORT NO. CSTR-575

CONTRACT NO. AFOSR-82-0275

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0351

UNCLASSIFIED REPORT

ABSTRACT: (U) Multigrid methods are proving themselves as (very) successful tools for the solution of the algebraic equations associated with discretization of elliptic boundary-value problems. Nevertheless, it seems we are just beginning to 'understand' this powerful idea. Hence, there is a need for continued probing, experimentation and new proofs - less for the sake of proof and more for the sake of insight. This report considers the extension to a general diffusion equation. In particular, for the two-grid scheme we reobtain the basic results indicate that other coefficients results carry over as well. Additional keywords: Algorithms; Linear algebraic equations; Problem solving; Estimates; Experimental data.

DESCRIPTORS: (U) *GRIDS, METHODOLOGY, ESTIMATES, EXPERIMENTAL DATA, ALGEBRA, ALGORITHMS, BOUNDARY VALUE PROBLEMS, DIFFUSION, ELLIPSES, EQUATIONS, LINEAR ALGEBRAIC EQUATIONS, PROBLEM SOLVING

IDENTIFIERS: (U) *Multigrid methods

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AD-A153 869 12/1

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) A O 487 Throughput Limited Sensing Algorithm.

DESCRIPTIVE NOTE: Technical rept..

MAR 85 38P

PERSONAL AUTHORS: Georgiadis, L.; Papantoni-Kazakos, P. ;

REPORT NO. UCT/DECS/TR-85-3

CONTRACT NO. AFOSR-83-0229

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0397

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors consider Poisson packet traffic, accessing a single slotted channel. They assume the existence of ternary feedback, per channel slot. They also adopt the limited feedback sensing model, where each packet senses the feedback only while it is blocked. For the above model, they develop a collision resolution protocol, with last-come first serve characteristics, and we name the protocol, LSTFA. The LSTFA is a refinement of the algorithm developed in another document and it attains the same throughput as Gallager's algorithm does, without the full feedback sensing requirement in the latter. The algorithm is also easy to implement, it requires reasonable memory storage, it induces uniformly good transmission delays, and it is robust in the presence of feedback errors. In the presence of binary (collision versus noncollision) feedback, the algorithm may attain throughput 0.4493; the highest known to this point, among both full and limited sensing algorithms. (Author)

DESCRIPTORS: (U) *ALGORITHMS, CHANNELS, COLLISIONS, DELAY, DETECTION, ERRORS, FEEDBACK, LIMITATIONS, MODELS, REFINING, REQUIREMENTS, RESOLUTION, SLOTS, TERNARY COMPOUNDS, TRANSMISSION LINES

AD-A153 869

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A153 867 CONTINUED

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Preparation of Well-Defined Surfaces at Atmospheric Pressure Studies by Electrochemistry and LEED of Pt(100) Pretreated with Iodine.

84 6P

PERSONAL AUTHORS Wleckowski, A.; Rosasco, S. D.; Schardt, B.
C. Stickney, J. L.; Hubbard, A. T.

CONTRACT NO AFOSR-81-0149

PROJECT NO 2303

TASK NO A1

MONITOR AFOSR
TR 85-0384

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE Pub in Inorganic Chemistry, v23 n5
p585 569 1984

ABSTRACT (U) Reported here are studies by LEED, Auger spectroscopy and electrochemistry which show that Pt(100) monocrystal surfaces purposely disordered by electrochemical oxidation and reduction (as in the procedure commonly employed to clean or activate Pt electrodes) are restored to an ordered state by programmed heating under an Ar atmosphere containing iodine vapor. A nearly hexagonal, centered-rectangular adlattice of I atoms was formed, containing three I and five Pt atoms in the surface unit cell. Programmed heating of this adlattice led to stepwise desorption of halogen and produced a series of related adlattices. One of these is particularly amenable to identification, without LEED by means of its characteristic cyclic voltammogram for silver electrodeposition. The behavior of each iodine adlattice toward silver electrodeposition and programmed temperature desorption is reported. These atmospheric iodine pretreatment and voltammetric procedures for preparing and verifying a well-defined electrode surface do not require vacuum equipment, although demonstration of the ordered structures in this work employed LEED and related techniques under ultrahigh vacuum. This basic approach should be applicable to a wide range of metals and adsorbates.

AD A153 867

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DESCRIPTORS: (U) *PLATINUM, *SINGLE CRYSTALS, *ELECTRON DIFFRACTION, *ELECTROCHEMISTRY, *AUGER ELECTRON SPECTROSCOPY, *ELECTRODES, HEAT TREATMENT, CRYSTAL LATTICES, VOLTAMMETRY, ATMOSPHERES, IODINE, DESORPTION, ATOMS, VAPORS, BAROMETRIC PRESSURE, ORDER DISORDER TRANSFORMATIONS, ELECTRODEPOSITION, ULTRAHIGH VACUUM, ELECTRODES, SURFACES, DESORPTION, TEMPERATURE, ELECTROCHEMISTRY, REPRINTS

IDENTIFIERS: (U) LEED(Low Energy Electron Diffraction),
PEB1102F, WJAFOSR2303A1

AD-A158 954

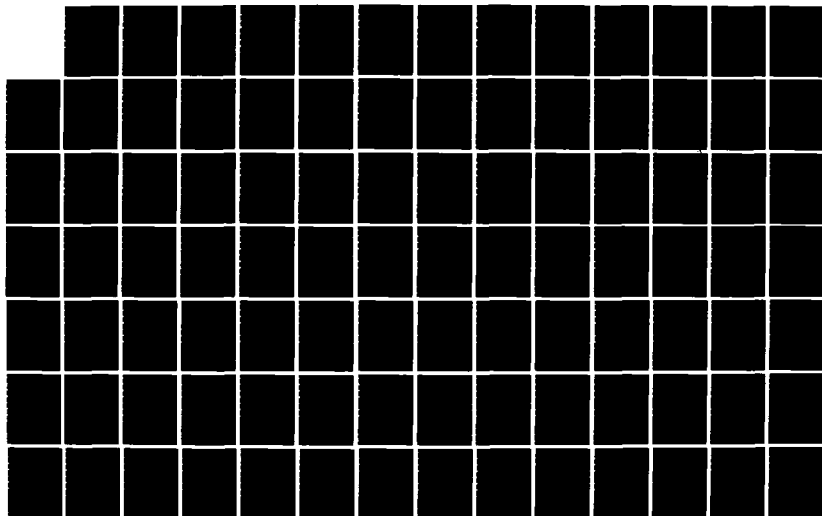
AFOSR TECHNICAL REPORT SUMMARIES SECOND QUARTER CY 1985
(U) AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB
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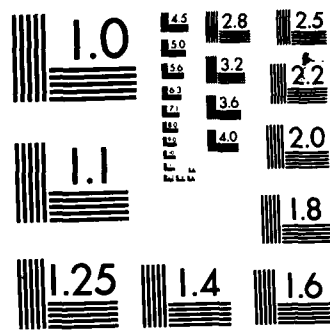
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MICROCOPY RESOLUTION TEST CHART
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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A153 864 20/2

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) The Role of Phonons in the Excitation and Relaxation of Adspecies.

DEC 83 10P

PERSONAL AUTHORS: Berl, A. C.; Lee, K. T.; George, T. F.;
REPORT NO. 57

CONTRACT NO. AFOSR-82-0048

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0363

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the
International Conference on Lasers, p362-369, 12-16 Dec
83.

ABSTRACT: (U) The IR laser excitation of an adbond is studied by both a quantum mechanical generalized master equation approach and a classical generalized Langevin approach. The role of phonons in the energy flow between the adbond and the surface is considered. The latter approach looks further at local heating via direct excitation of surface atoms. It is seen that the Markovian approximation is in general inadequate, and the local heating is an important mechanism for desorption. Keywords include: Laser-excited adbond, Relaxation, Role of phonons, Quantum generalized master equation, Classical generalized Langevin equation, Breakdown of Markovian approximation, Desorption, and Local heating of surface atoms.

DESCRIPTORS: (U) *PHONONS, APPROACH, ATOMS, BREAKDOWN(ELECTRONIC THRESHOLD), DESORPTION, ENERGY TRANSFER, EQUATIONS, EXCITATION, HEATING, LASERS, MARKOV PROCESSES, QUANTUM THEORY, RELAXATION, APPROXIMATION(MATHEMATICS), REPRINTS

IDENTIFIERS: (U) PE61102F, WUNR631303, WUAFOSR2303A2

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AD-A153 848 20/5

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Laser-Induced Intermodulated Flame Fluorescence: A New Approach to Scattering Correction in Analytical Atomic Fluorescence.

84 18P

PERSONAL AUTHORS: Omenetto, N.; Hart, L. P.; Winefordner, J. D.;

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0410

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Spectroscopy, v38 n5
p619-624 1984.

ABSTRACT: (U) It is shown that the technique of intermodulated fluorescence can effectively correct for scattering problems in analytical flame fluorescence spectroscopy. When two laser beams, amplitude-modulated at different frequencies f sub 1 and f sub 2 and counterpropagated colinearly throughout an atomizer, are tuned to the absorption transition of the element of interest, non-linear mixing of the fluorescence signal results, due to saturation effects. By extraction of the signal at the sum or difference frequency, f sub 2 + or - f sub 2, the linear scattering component of the spectrum can be essentially eliminated. This has been demonstrated for a sodium solution nebulized in a premixed, laminar, argon-oxygen-hydrogen flame. Because the modulation volume signal can be observed only at the intersection of the two beams, this technique constitutes a powerful tool for spatially resolved combustion diagnostics. Keywords include: Flame, Fluorescence, Intermodulation, Laser excitation, Atomic fluorescence, and Scatter.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, ABSORPTION, COMBUSTION, CORRECTIONS, DIAGNOSIS(GENERAL), DIFFERENCE FREQUENCY, EXCITATION, EXTRACTION, FLAMES, FLUORESCENCE.

AD-A153 848

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A153 848 CONTINUED

AD-A153 842 7/4 21/2

LASER BEAMS, LASERS, LINEARITY, MIXING, MODULATION,
NONLINEAR SYSTEMS, SATURATION, SCATTERING, SIGNALS,
SODIUM, SOLUTIONS(GENERAL), SPECTROSCOPY, TRANSITIONS,
REPRINTS

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Resonant CARS Detection of OH Radicals.

DESCRIPTIVE NOTE: Final rept. 1 Aug 81-31 Dec 84,

IDENTIFIERS: (U) Flame fluorescence, PE61102F,
WJAFOSR2303A1

JAN 85 48P

PERSONAL AUTHORS: Verdieck, J. F. ; Hall, R. J. ; Eckbreth, A.
C. ;

REPORT NO. UTRC/R85-955655

CONTRACT NO. F49620-81-C-0063

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-85-0385

UNCLASSIFIED REPORT

ABSTRACT: (U) Under this AFOSR contract, resonant CARS (Coherent Anti-Stokes Raman Spectroscopy) of OH has been observed for the first time. Resonant CARS was achieved for several electronic transitions in the ultraviolet A--X bands of OH in a methane/oxygen flame. Saturation of the resonant CARS spectrum of OH was examined experimentally and definite evidence found, both in the intensity variation, and the number and shapes of the lines. Concurrently with the experimental studies, a good understanding of the theoretical aspects of the resonant CARS process has been secured, to the extent that predicted resonant CARS spectra can be computer synthesized and graphed for any selected frequency. A major departure from theoretical predictions was the experimental observation of satellite lines about the central line, not predicted from theory. At present, the cause of these extra resonances has not been determined, but their appearance may arise from saturation effects, or be caused by an undetermined nonlinear optical effect (such as dephasing--induced coherences). Another contributing factor may be rotational energy level transfer brought about by collision processes, occurring within the duration of the 10 nanosecond laser phase.

DESCRIPTORS: (U) *HYDROXYL RADICALS, *RAMAN SPECTROSCOPY,

AD-A153 848

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COHERENCE, COLLISIONS, ELECTRON TRANSITIONS, ENERGY LEVELS, ENERGY TRANSFER, FLAMES, METHANE, OPTICAL PROPERTIES, OXYGEN, PREDICTIONS, RAMAN SPECTROSCOPY, ROTATION, SATURATION, THEORY, SPECTRAL LINES, ULTRAVIOLET SPECTRA, CONCENTRATION(CHEMISTRY)

IDENTIFIERS: (U) WJAFOSR2308A3, PEG1102F, CARS(Coherent Antistokes Raman Spectroscopy), WJAFOSR2308A3, PEG1102F

AD-A153 838 20/8

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Equivalent Potentials for Equations of State for Fluids of Nonspherical Molecules.

AUG 84 7P

PERSONAL AUTHORS: Williams, G. O. ; Lebowitz, J. L. ; Percus, J. K. ;

CONTRACT NO. AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0354

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v81 n4 p2070-2075, 15 Aug 84.

ABSTRACT: (U) This investigation analyzes the extent to which the equation of state and other thermodynamic properties of systems of hard nonspherical molecules can be obtained from a density independent hard sphere reference system. It is concluded that the median and Barker-Henderson prescriptions effectively reproduce all data now available. The motivation for these two formulations is discussed in detail. Originator-supplied keywords include: Molecular fluids; Nonspherical interactions; Hard sphere reference system; Median potential; and Barker-Henderson prescription.

DESCRIPTORS: (U) *MOLECULAR ASSOCIATION, EQUATIONS OF STATE, FLUIDS, FORMULATIONS, HARDENING, HARDNESS, INTERACTIONS, MOLECULES, MOTIVATION, SPHERES, THERMODYNAMIC PROPERTIES, REPRINTS

IDENTIFIERS: (U) WJAFOSR2301A3, PEG1102F

AD-A153 842

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A153 837 20/9

AD-A153 838 20/8

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICSRUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS(U) Exact Results for the Two-Dimensional One-Component
Plasma.(U) A One Molecular Fluid Approximation for Diatomic Fluid
Mixtures.

JUL 84 3P

DEC 84 8P

PERSONAL AUTHORS: Nicolaides, D. ;

PERSONAL AUTHORS: Walsman, E. M. ; Lebowitz, J. L. ; MacGowan,
D. ;

CONTRACT NO. AFOSR-82-0018

CONTRACT NO. AFOSR-82-0018

PROJECT NO. 2301

PROJECT NO. 2301

TASK NO. A3

TASK NO. A3

MONITOR: AFOSR
TR-85-0352MONITOR: AFOSR
TR-85-0357

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physics Letters,
v103A n5 p277-278, 9 JUL 84.SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v81
n12 pt.2 p6098-6099, 15 DEC 84.ABSTRACT: (U) We show that the free energy and
correlation functions of the two dimensional one-
component plasma at the special temperature can be
explicitly computed by solving a free-field Dirac
equation. Keywords include: Exact results, One-component
plasma; Two dimensions; Free energy correlation functions;
and Special temperature.ABSTRACT: (U) We investigate a one component molecular
fluid approximation for conformally similar molecules. We
test this scheme on (two) mixtures of rigid homonuclear
diatomic Lennard-Jones (LJ) fluids for which a limited
amount of information from molecular dynamics simulations
is available. For two components of approximately equal
bond length but different LJ parameters our results
compare favorably with the machine computations. From the
very few simulation data available for equimolar mixtures
of molecules differing only in their bond lengths we
cannot reach any firm conclusion. Alternative procedures
for treating general molecular fluid mixtures are
discussed. Keywords include: Molecular fluids; Mixtures;
Homonuclear molecules, and One fluid approximation.DESCRIPTORS: (U) *PLASMASPHERE, CORRELATION TECHNIQUES,
FREE ENERGY, FUNCTIONS(MATHEMATICS), TEMPERATURE, TWO
DIMENSIONAL, FREE FIELD, REPRINTS

IDENTIFIERS: (U) WUAFOSR2301A3, PE61102F

DESCRIPTORS: (U) *FLUIDS, *DIATOMIC MOLECULES, BONDED
JOINTS, DYNAMICS, LENGTH, MIXTURES, MOLECULAR PROPERTIES,
MOLECULES, NUCLEAR PROPERTIES, PARTS, SIMULATION,
REPRINTS

IDENTIFIERS: (U) WUAFOSR2301A3, PE61102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A153 833 20/9

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) The Two-Dimensional One-Component Plasma in an Inhomogeneous Background: Exact Results.

DEC 84 18P

PERSONAL AUTHORS: Alastuey, A.; Lebowitz, J. L.;

CONTRACT NO. AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0362

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physique, v45 p1859-1874 Dec 84.

ABSTRACT: (U) We study the general inhomogeneous two-dimensional jellium where the background density varies in one space direction only. At $p = 2$, explicit functional representations of the one- and two-body densities of the particles are derived in terms of the electrostatic potential created by the background. The present model can be used for describing a large variety of charged interfaces. Keywords include: One-component plasma; exact results, nonuniform background; charged interfaces; and Reprints.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), TWO DIMENSIONAL, REPRINTS, BACKGROUND, DENSITY, ELECTROSTATICS, INTERFACES, NONUNIFORM, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A3

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AD-A153 830 21/2 21/4 14/2 21/5

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) Research Test Facility for Evaporation and Combustion of Alternative Jet Fuels at High Air Temperatures.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 83-30 Jan 84,

MAR 84 45P

PERSONAL AUTHORS: Peters, J. E.; Krier, H.; Kim, K. K.; Coverdill, R. E.; Kirwan, J. E.;

REPORT NO. UILU-ENG-84-4001

CONTRACT NO. F49620-83-K-0027

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0383

UNCLASSIFIED REPORT

ABSTRACT: (U) Improved gas turbine combustion performance will require the effective utilization of alternative fuels and advanced combustor concepts. Further understanding of spray combustion processes including fuel evaporation and flame propagation is required. Research is underway which features a high pressure and temperature non-vitiated air system to provide air at simulated gas turbine inlet conditions. A special fuel injection system was designed to produce monodisperse sprays for the purpose of evaporation and eventual combustion experiments in our newly developed test facility. This report represents a summary of the engineering activities during the first year (of a two year contract) which was focused on the construction of a combustion test facility in which the evaporation and burning rates of jet fuels can be measured as a function of inlet conditions and fuel properties. A large heat exchanger facility which supports this research can deliver continuously non-vitiated air at flowrates up to 1 kg/sec and 800 kPa at temperatures from 300 to 900K. Details of the evaporation/combustion test section are described. Also included are the design of the fuel

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A153 830 CONTINUED

Injection system and test results of the injector showing monodisperse sprays with drop diameters of approx. 70 micrometers.

DESCRIPTORS: (U) *TEST FACILITIES, *COMBUSTION, *FUEL SPRAYS, BURNING RATE, COMBUSTION CHAMBERS, COMBUSTORS, EVAPORATION, FACILITIES, FLAME PROPAGATION, FLOW RATE, FUEL INJECTION, FUELS, FUNCTIONS, GAS TURBINES, HEAT EXCHANGERS, HIGH PRESSURE, INLETS, PERFORMANCE(ENGINEERING), RESEARCH FACILITIES, SPRAYS, TEST EQUIPMENT, TEST FACILITIES, TEST METHODS, AIR FLOW, MEASUREMENT, JET ENGINE INLETS

IDENTIFIERS: (U) Alternative jet fuels, Nonvilitated air, Monodisperse sprays, PE81102F, WJAFQSR2308A2

AD-A153 827 20/7

MARYLAND UNIV COLLEGE PARK

(U) Experimental and Theoretical Investigation of Microwave and Millimeter Wave Radiation from Hollow, Rotating Electron Beams.

DESCRIPTIVE NOTE: Annual progress rept. 1 Dec 83-30 Nov 84.

DEC 84 58P

PERSONAL AUTHORS: Destler, W. W. ;

CONTRACT NO. AFOSR-83-0013

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-85-0408

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of the production of microwave and millimeter wave radiation from rotating electron beams have been pursued at the University of Maryland under AFOSR sponsorship since 1978. In the period 1978-1981, these studies centered the broadband radiation produced when a rotating electron beam interacts with the TE and/or TM modes of a smooth cylindrical conducting boundary system. These early studies led in 1981 to the first demonstration of a new type of coherent radiation source at microwave and millimeter wave wavelengths with demonstrable advantages over existing sources. This device, informally called a Cusp Injected Magnetron of Cusptron by members of our group, produces radiation by the resonant interaction of a rotating electron beam with the modes of a magnetron-type conducting boundary.

DESCRIPTORS: (U) *MAGNETRONS, *ELECTRON BEAMS, BOUNDARIES, DEMONSTRATIONS, ELECTRON BEAMS, INTERACTIONS, MAGNETRONS, MARYLAND, MICROWAVES, MILLIMETER WAVES, PRODUCTION, RADIATION, RESONANCE, THEORY, UNIVERSITIES

AD-A153 830

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

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AD-A153 814 12/1

STANFORD UNIV CA DEPT OF CHEMISTRY

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Effect of Internal and Translational Energy on the $\text{NH}_3(+) (\text{V}) + \text{D}_2$ Ion-Molecule Reaction.

(U) Limit Behaviour for Stochastic Monotonicity and Applications.

FEB 85 8P

DESCRIPTIVE NOTE: Technical rept.,

FEB 85 49P

PERSONAL AUTHORS: Morrison, R. J. S.; Conaway, W. E.; Zare, R. N.;

CONTRACT NO. F49620-83-C-0033

PERSONAL AUTHORS: Cohn, H.;

PROJECT NO. 2303

REPORT NO. TR-93

TASK NO. B1

CONTRACT NO. F49620-82-C-0009

MONITOR: AFOSR

PROJECT NO. 2304

TR-85-0399

TASK NO. A5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v113 n5 p435-440, 1 Feb 85.

ABSTRACT: (U) Using $2+$ multiphoton ionization, $\text{NH}_3(+)$ is prepared in selected levels of the v_2 bending mode ($\text{v}=0-7$) and the $\text{NH}(+)$ + D_2 reaction is studied as a function of the center-of-mass collision energy (1-10 eV). The exchange channel ($\text{NH}_2\text{D}+\text{HD}$ or $\text{H} + \text{D}$) is enhanced by ion vibrational excitation whereas the addition channel ($\text{NH}_3\text{D}+ + \text{D}$) is almost unaffected.

DESCRIPTORS: (U) *IONIZATION, *AMMONIA, *DEUTERIUM, CATIONS, COLLISIONS, ENERGY, EXCITATION, VIBRATION, COLLISIONS, ENERGY, VIBRATION, MOLECULAR IONS, REPRINTS

IDENTIFIERS: (U) Multiphoton ionization, Ion molecule interactions, WUAFOSR2303B1, FEB1102F

UNCLASSIFIED REPORT

ABSTRACT: (U) A transition probability function P is said to be stochastically monotone if $P(x, -\text{ALPHA}, y)$ is non-increasing in x for every fixed y . A (non-homogeneous) Markov chain or process is said to be stochastically monotone if its transition probability functions are stochastically monotone. Diffusions, random walks, birth-and-death and branching processes are examples of such models. It is shown that stochastically monotone processes exhibit two basic types of asymptotic behaviour. Chains with stationary transition probabilities display a cyclic pattern, and a suitably normed and centered chain turns out to converge almost surely if its is geometrically growing. Applications to diffusions and branching processes are added.

DESCRIPTORS: (U) *CHI SQUARE TEST, ASYMPTOTIC SERIES, INTERVALS, LEAST SQUARES METHOD, STATISTICAL DISTRIBUTIONS, STOCHASTIC CONTROL

IDENTIFIERS: (U) *Pearson chi square test. Goodness of fit, WUAFOSR2304A5, FEB1102F

AD-A153 818

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A153 790 12/1

AD-A153 789 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Moment Inequalities for Real and Vector p-Stable Stochastic Integrals.

DESCRIPTIVE NOTE: Technical rept.,

(U) Extent to which Least-Squares Cross-Validation Minimises Integrated Square Error in Nonparametric Density Estimation.

DEC 84 20P

DESCRIPTIVE NOTE: Technical rept.,

PERSONAL AUTHORS: Woyczynski, W. A. ;

FEB 85 27P

REPORT NO. TR-87

PERSONAL AUTHORS: Hall, P. ; Marron, J. S. ;

CONTRACT NO. F49620-82-C-0009

REPORT NO. TR-94

PROJECT NO. 2304

CONTRACT NO. F49620-82-C-0009

TASK NO. A5

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0403

TASK NO. A5

MONITOR: AFOSR
TR-85-0401

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the International Conference on Probability in Banach Space, 1984, Medford, MA.

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper describes moment inequalities for single and double stochastic integrals with respect to p-stable motion. The proofs are based on the author's work on the structure of single and multiple p-stable integrals and inequalities for moments of exit times of a p-stable motion in previous works. Its results do not apply directly to the situation in which the author's want to use them, in particular, because one dimensional processes are explicitly excluded there. So they offer the needed variation of their result. The author's propose an extension of the theory of stochastic integration with respect to a p-stable motion, to the case when the latter takes values in a Banach space.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, INEQUALITIES, INTEGRALS, INTEGRATION, MOMENTS, ONE DIMENSIONAL, WORK, BANACH SPACE

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A153 786 12/1

AD-A153 785 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On the Characterization of Nonnegatively Estimable Linear Combinations of Variance Components.

(U) Detection of Multivariate Outliers with Dispersion Slippage in Elliptically Symmetric Distributions.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

MAR 85 17P

MAR 85 15P

PERSONAL AUTHORS: Mathew, T. ;

PERSONAL AUTHORS: Das, R. ; Sinha, B. K. ;

REPORT NO. TR-85-06

REPORT NO. TR-85-04

CONTRACT NO. F49620-85-C-0008

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0353

MONITOR: AFOSR
TR-85-0366

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This document shows that, by a reparametrization, the problem of estimating a linear combination of variance components can be reduced to that of estimating single variance component. Such a reduction is used to obtain some characterizations of nonnegatively estimable linear combinations of various components. Characterization of nonnegative estimability using MINQUE is also discussed. Additional keywords: quadratic subspace, QUE's (quadratic unbiased estimators).

ABSTRACT: (U) An extension of Ferguson's univariate normal results for detection of outliers with variance slippage is made to the multivariate elliptically symmetric case with dispersion slippage. The locally optimum test statistic derived possesses all three robustness properties: optimality, null and nonnull. As a technical tool, Wijsman's representation theorem is used. Additional keywords: Locally best invariant, Maximal invariant, and Variance slippage. (Author)

DESCRIPTORS: (U) *ANALYSIS OF VARIANCE, ESTIMATES, LINEARITY, VARIATIONS, PARTS

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *STATISTICAL TESTS, DETECTION, SYMMETRY, THEOREMS, TOOLS, INVARIANCE, OPTIMIZATION

IDENTIFIERS: (U) Quadratic subspace, Quadratic unbiased estimators, WUAFOSR2304A5, PE61102F

IDENTIFIERS: (U) *Outliers, Robustness, WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS

PERTURBATION THEORY, PREDICTIONS, THERMODYNAMICS,
POTENTIAL ENERGY, PRESSURE, REPRINTS

(U) Thermodynamics of Homonuclear Diatomic Fluids from the
Angular Median Potential.

IDENTIFIERS: (U) Diatomic fluids, Median potential,
Spherical reference system, Denotation regime, Atom atom
interactions, PE61102F, WUAFOSR2301A3

MAR 84 10P

PERSONAL AUTHORS: MacGowan, D. ; Waisman, E. M. ; Lebowitz, J.
L. ; Percus, J. K. ;

CONTRACT NO. AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0358

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics v80
n8 p2719-2726, 15 Mar 84. Prepared in cooperation with S-
Cubed, La Jolla, CA, F49620-83-C-0022.

ABSTRACT: (U) The use of the angular median potential as
a temperature-independent spherical reference system for
approximating molecular fluids is tested for its
prediction of thermodynamics. Calculations have been
carried out for a wide range of homonuclear diatomics
with continuous atom-atom potentials believed to be
representative of the full range of simulation data
available for such systems. The results of the pressure
are surprisingly good both in the denotation regime and
around the triple point. In the latter case, however, the
internal energies for highly elongated molecules with
attractive potential wells are considerably too positive.
Comparison with other perturbation theories indicates
that the median reference system gives better pressures
but poorer energies than RAM, and that in many cases,
especially for purely repulsive potentials, it gives
results of comparable accuracy to those obtained with
nonspherical reference systems. Keywords: Diatomic fluids;
median potential; spherical reference system; denotation
regime; triple point; Reprints.

DESCRIPTORS: (U) *FLUIDS, *DIATOMIC MOLECULES,
*THERMODYNAMICS, ACCURACY, NUCLEAR PROPERTIES,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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ROCKWELL INTERNATIONAL THOUSAND OAKS CA
MICROELECTRONICS RESEARCH AND DEVELOPMENT CENTER

IDENTIFIERS: (U) PE61102f, WUAFOSR2305B2

(U) Passivation on High Q Acoustic Strain Sensor for
Accelerometer.

DESCRIPTIVE NOTE: Final technical rept. 14 Feb 82-13 Jul
84.

NOV 84 39P

PERSONAL AUTHORS: Motamedi, M. W. ;

REPORT NO. MRDC-41108.3FR

CONTRACT NO. F49620-82-C-0012

PROJECT NO. 2305

TASK NO. 82

MONITOR: AFOSR
TR-85-0281

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective is to study the passivation effects on the frequency stability of SAW resonators. Cantilever SAW accelerometers based on the SAW resonator to be sensing element of acceleration is considered for a wide spectrum of Air Force applications. To produce the desired accuracy, a quartz beam is designed with the required sensitivity and a size adequate for the resonator structure. A theory of interface waves is developed for the purpose of material and thickness selection of passivation layers. Preliminary results indicated that Y2O3 (yttrium oxide) and AlN (aluminum nitride) were the best materials for passivation of SAW resonators. Keywords include: Accelerometer, Frequency stability, Interface and layered waves, Surface effects, Passivation films, SiO2, Aln, Y2O3.

DESCRIPTORS: (U) *RESONATORS, *SURFACE ACOUSTIC WAVE DEVICES, ACCELERATION, ACCELEROMETERS, ACCURACY, AIR FORCE OPERATIONS, ALUMINUM, CANTILEVER BEAMS, FILMS, FREQUENCY, INTERFACES, LAYERS, MATERIALS, NITRIDES, PASSIVITY, QUARTZ, SELECTION, SPECTRA, STABILITY, STRUCTURAL PROPERTIES, SURFACE PROPERTIES, THEORY, THICKNESS, WAVES, YTTRIUM OXIDES

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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AD-A153 405 7/4

TEXAS A AND M UNIV COLLEGE STATION DEPT OF ELECTRICAL
ENGINEERING

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Interim Report for Grant AFOSR-82-0033.

(U) Preparation of Well-Defined Surfaces at Atmospheric
Pressure: Studies of Structural Transformations of I,
Ag-Adlattices on Pt(111) by Leed and Electrochemistry,

DESCRIPTIVE NOTE: Rept. for 1 Jan-31 Dec 84,

JAN 85 12P

84 21P

PERSONAL AUTHORS: Halverson, D. ;

PERSONAL AUTHORS: Wieckowski, A. ; Schardt, B. C. ; Rosasco, S.
D. ; Stickney, J. L. ; Hubbard, A. T. ;

CONTRACT NO. AFOSR-82-0033

CONTRACT NO. AFOSR-81-0149

MONITOR: AFOSR
TR-85-0299

PROJECT NO. 2303

TASK NO. A1

UNCLASSIFIED REPORT

ABSTRACT: (U) A number of results were obtained pertaining to signal detection and data compression for image processing. These results led to improved performance over previous approaches, with special attention given to methods which required less statistical knowledge and which were easier to implement. In particular, robustness and nonparametric techniques were employed to allow the exploitation of whatever knowledge was available, while retaining insensitivity to the remaining inexactness in knowledge. In addition, because the presence of dependency in the underlying random processes often complicates detector design, investigations into when weak dependency could be ignored were undertaken; moreover, results were obtained pertaining to the general subject of the extent of variation (induced by incomplete knowledge of the dependency) in the form of the detector data processor. Finally, some results were obtained which allowed relaxing stationarity assumptions which were placed on the signal in earlier work. (Author)

DESCRIPTORS: (U) *IMAGE PROCESSING, *NONPARAMETRIC
STATISTICS, SIGNAL PROCESSING, DATA COMPRESSION, DATA
PROCESSING EQUIPMENT, DETECTION, DETECTORS, SIGNALS

IDENTIFIERS: (U) Robustness, WJAFOSR2304A5, PE61102F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v146 p115-134
1984.

ABSTRACT: (U) Pt(111) surfaces disordered by ion-bombardment or electrochemical oxidation were converted to well-defined, ordered states by annealing in iodine vapor at atmospheric pressure. A structure not obtainable in vacuum was formed. Pt(111)(3 x 3) containing 0.62 I atoms per surface Pt atom in a slightly distorted hexagonal array. The I-I interatomic distances in this structure, 0.33 and 0.36 nm, were less than the Van der Waals distance, 0.43 nm. Gentle heating of this structure under pure Ar yielded I2 molecules. I atoms and a series of structures. The Pt(111) x the square root of 7 x the square root of seven R 19.1 deg - I adlattice proved to be identifiable from its distinctive electrochemical behavior in electrodeposition of Ag from aqueous solutions of AgClO4, which consists of three prominent structural transitions. Kinematic calculations of the directions and qualitative intensities of the LEED beams at selected kinetic energies has led to proposed structures consisting of Ag atoms close-packed in registry with the three-fold sites of Pt but with I atoms substituted for Ag atoms at the (square root of 3 x square root of three)R30 deg positions. Phase boundaries caused by reversals of the two packing sites of the

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AD-A152 924 CONTINUED

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) CLEANROOM Software Development: An Empirical Evaluation.

ENGINEERING, *COMPUTER PROGRAMS, HIGH RELIABILITY, PROGRAMMERS, INTEGRATED SYSTEMS, TEST METHODS, METHODOLOGY, TEST AND EVALUATION, CODING, HIGH DENSITY, OFF LINE SYSTEMS, TEAMS(PERSONNEL)

DESCRIPTIVE NOTE: Technical rept..

IDENTIFIERS: (U) Cleanroom software development, WUAFOSR2304A2, PE61102F

FEB 85 34P

PERSONAL AUTHORS: Selby, R. W., Jr.; Basili, V. R.; Baker, F. T. ;

REPORT NO. TR-1415

CONTRACT NO. F49620-80-C-0001

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0292

UNCLASSIFIED REPORT

ABSTRACT: (U) The Cleanroom software development approach is intended to produce highly reliable software by integrating formal methods for specification and design, complete off-line development, and statistically based testing. In an empirical study, 15 three-person teams developed versions of the same software system; ten teams applied Cleanroom, while five applied a more traditional approach. This analysis characterizes the effect of Cleanroom on the delivered product, the software development process, and the developers. The major results of this study are (1) most developers were able to apply the techniques of Cleanroom effectively; (2) the Cleanroom teams' products met system requirements more completely and had a higher percentage of successful test cases; (3) the source code developed using Cleanroom had more comments and less dense complexity; (4) the use of Cleanroom successfully modified aspects of development style; and (5) most Cleanroom developers indicated they would use the approach again. Originator-supplied keywords included: Software development methodology; Off-line software review; Software measurement; Methodology evaluation; Software management; and Empirical study.

DESCRIPTORS: (U) *DISTRIBUTED DATA PROCESSING, *SYSTEMS

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

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AD-A152 926

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NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On Stochastic Integral Representation of Stable Processes with Sample Paths in Banach Spaces.

(U) Estimating Random Integrals from Noisy Observations: Sampling Designs and Their Performance.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

JAN 85

40P

DEC 84

53P

PERSONAL AUTHORS: Rosinski, J. ;

PERSONAL AUTHORS: Bucklew, J. A. ; Cambanis, S. ;

REPORT NO. TR-88

REPORT NO. TR-86

CONTRACT NO. F49620-82-C-0009

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0296

TR-85-0297

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Certain path properties of a symmetric α -stable process are studied in terms of the kernel h . The existence of an appropriate modification of the kernel h enables one to use results from stable measures on Banach spaces in studying of X . Bounds for the moments of the norm of sample paths of X are obtained. This yields definite bounds for the moments of a double α -stable integral. Also necessary and sufficient conditions for the absolute continuity of sample paths of X are given. Along with the above stochastic integral representation of stable processes, the representation of stable random vectors due to LePage, Woodroffe and Zinn is extensively used and the relationship between these two representations is discussed. (Author).

SUPPLEMENTARY NOTE: Prepared in cooperation with Wisconsin Univ., Madison, Dept. of Electrical and Computer Engineering.

ABSTRACT: (U) The problem of estimating a weighted average of a random process from noisy observations at a finite number of sampling points is considered. The performance of sampling decisions with optimal or suboptimal, but easily computable, estimator coefficients is studied. Several examples and special cases are studied including additive independent noise, nonlinear distortion with noise, and quantization noise. (Author).

DESCRIPTORS: (U) *STATISTICAL SAMPLES, COEFFICIENTS, ESTIMATES, NOISE, QUANTIZATION, DISTORTION, NONLINEAR SYSTEMS

DESCRIPTORS: (U) *CRITICAL PATH METHODS, *STOCHASTIC PROCESSES, STABILITY, BANACH SPACE, INTEGRALS

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A152 982 7/4

AD-A152 932 12/1

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Electrochemical Processes at Well-Defined Surfaces.

(U) Nonsmooth Analysis and Frechet Differentiability of M-Functionals.

84 25P

PERSONAL AUTHORS: Hubbard, A. T.; Stickney, J. L.; Sorlaga, M. P.; Chia, V. K. F.; Rosasco, S. D.;

DESCRIPTIVE NOTE: Technical rept..

JUN 84

27P

CONTRACT NO. AFOSR-81-0149

PERSONAL AUTHORS: Clarke, B. R.;

PROJECT NO. 2303

CONTRACT NO. F49620-82-C-0009

TASK NO. A1

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0338

TASK NO. A5

MONITOR: AFOSR
TR-85-0298

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl of Electroanalytical Chemistry v168 p43-66 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) The structures of layers of atoms and ions formed on well-characterized single-crystal electrode surfaces in vapor and in electrolytic solutions at atmospheric pressure have been investigated by means of LEED, Auger spectroscopy, cyclic voltammetry and related techniques. Electrodeposited layers of metals were generally found to be highly ordered when deposited onto well-defined substrates. Layer structure proved to be a sensitive function of the structure of pre-adsorbed adlattices. In related studies, organic compounds of various types were found to form a layer of oriented adsorbed molecules on atomically smooth substrates. Reactivity of these oriented adsorbed intermediates was sharply dependent upon orientation. Findings of this latter type involved accurate packing density measurements using thin-layer electrodes. Recent work will be reviewed and additional findings presented.

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *ELECTRODES, *SURFACE CHEMISTRY, ELECTRON DIFFRACTION, CRYSTAL LATTICES, REPRINTS, AUGER ELECTRON SPECTROSCOPY, LAYERS, VOLTAMMETRY, METALS, PACKING DENSITY

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1

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ABSTRACT: (U) A necessary requirement for existence of the Frechet derivative is that the defining psi function is uniformly bounded, and this naturally excludes those nonrobust estimators such as the maximum likelihood estimator in normal parametric models. In this paper the methods of nonsmooth analysis, described in the book by F. H. Clarke (1983), are introduced to the theory of statistical expansions, and are used here in the proofs of weak continuity and Frechet differentiability of M-functionals. Subsequently the conditions for Frechet differentiability given in Clarke (1983) can be relaxed to include most popular M-functionals. Additional keywords: distribution functions; M-estimators; robustness; gross error sensitivity; weak continuity; asymptotic expansions; asymptotic normality; selection functional; local uniqueness. (Author).

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, ESTIMATES, ASYMPTOTIC NORMALITY

IDENTIFIERS: (U) *Nonsmooth analysis, Robustness, WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A152 975 CONTINUED

AD-A152 971 22/1

Hydroquinone: Supporting electrolytes.

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF MATHEMATICS

DESCRIPTORS: (U) *CHEMISORPTION, *ELECTROCHEMISTRY, *OXIDATION, *PHENOLS, ORIENTATION(DIRECTION), REPRINTS, ADSORPTION, ELECTRODES, ELECTROLYTES, PACKING DENSITY, SURFACE ACTIVE SUBSTANCES, PLATINUM

(U) Nonlinear Time-Varying Generalized State-Space Systems: An Overview,

DEC 84 7P

IDENTIFIERS: (U) Hydroquinone, PE61102F, WJAFOSR2303A1

PERSONAL AUTHORS: Campbell, S. L. ;

CONTRACT NO. AFOSR-84-0240

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0288

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the IEEE Conference on Decision and Control (23rd) p268-273, 12-14 Dec 84.

ABSTRACT: (U) This paper reviews the current literature on nonlinear and time-varying generalized state-space systems of the form $F(t, y, \dot{y} \text{ to the 1st power}) = 0$.

DESCRIPTORS: (U) *SPACE SYSTEMS, REPRINTS, NONLINEAR SYSTEMS, TIME, VARIATIONS

IDENTIFIERS: (U) PE61102f, WJAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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AD-A152 975 7/4 7/3

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) The Role of the Tangent Mapping in Analyzing Bifurcation Behaviour.

(U) The Orientation and Electrochemical Oxidation of Hydroquinone Chemisorbed on Platinum Electrodes in Various Weakly Surface-Active Supporting Electrolytes.

84 7P

84 11P

PERSONAL AUTHORS: Find, J. P.; Rheinboldt, W. C.;

PERSONAL AUTHORS: Soriaga, M. P.; Chia, V. K.F.; White, J. H.; Song, D.; Hubbard, A.T.;

CONTRACT NO. AFOSR-84-0131

PROJECT NO. 2304

CONTRACT NO. AFOSR-81-0149

TASK NO. A3

PROJECT NO. 2303

MONITOR: AFOSR TR-85-0285

MONITOR: AFOSR TR-85-0333

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Zeitschrift fuer Angewandte Mathematik und Mechanik, v64 n9 p407-412 1984. Summary in German and English.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v182 p143-152 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) In the study of solution manifolds of parameter-dependent nonlinear equations, extended systems of equations play an important role, especially for the computation of singular points, such as turning points, bifurcation points, etc. Various extended systems have been proposed in the literature. Here it is shown that a central feature in the construction of extended systems is the tangent map of differential geometry. A theory of extended equations based on the tangent map is presented which also exhibits the close connection with the choice of local coordinate systems. The ideas and results are illustrated with an example of a continuously stirred chemical reactor.

ABSTRACT: (U) Studies on the adsorption, orientation and electrochemical oxidation of hydroquinone at smooth polycrystalline Pt electrodes in aqueous solutions of weakly surface-active electrolytes are reported. The electrolytes were compared with respect to how they influenced (i) the packing density vs. concentration curves, (ii) the oxidation n-values (n sub ox), and (iii) the packing density vs. electrode potential plots. Analytical measurements were based on thin-layer electrochemical methods. Six electrolytes were studied: HClO4 and NaClO4, H2SO4, H3PO4, NaF, NaPF6, and CsClO4. No significant electrolyte or pH-dependences were found for the T vs. c adsorption profiles. The n sub ox data for n superscript 6 and n superscript 2 orientations likewise were unaffected by changes in supporting electrolyte, although n sub ox was slightly lower at pH=7 than in 1 M H+. Changes in packing density with electrode potential correlate closely with adsorption of hydrogen (at E < 0.00 V vs. AgCl reference) and oxygen (at E greater than 0.40 V); weak but noticeable features at E greater than 0.20 V are consistent with the expected variation in specific adsorption of anions of supporting electrolyte. Originator supplied keywords include: Electrochemical oxidation; Platinum electrodes;

DESCRIPTORS: (U) *BIFURCATION(MATHEMATICS), *MAPPING, REPRINTS, CHEMICAL REACTORS, DIFFERENTIAL GEOMETRY, EQUATIONS, COORDINATES, TANGENTS

IDENTIFIERS: (U) FEB1102F, WJAFOSR2304A3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A152 991 CONTINUED

ILLINOIS UNIV AT URBANA FUSION STUDIES LAB

(U) Restrike Particle Beam Experiments on a Dense Plasma Focus. Opening Switch Research on a Dense Plasma Focus.

DESCRIPTORS: (U) *PLASMA WAVES, *PARTICLE BEAMS, ELECTRONS, ION BEAMS, DIAGNOSTIC EQUIPMENT, PINCH EFFECT, TEST METHODS, SCALING FACTORS, VOLTAGE, WAVEFORMS

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A7

DESCRIPTIVE NOTE: Final rept. 30 Sep 79-29 Sep 84.

JUN 85 6SP

PERSONAL AUTHORS: Gerdin, G. ;

REPORT NO. FSL-181

CONTRACT NO. AFOSR-79-0121

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0279

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on this grant has focused on plasma focus experiments in the areas of particle beam generation and as a potential repetitive opening switch. In pursuing the former unique diagnostic tools were developed to measure the scaling of particle beam current and energy for both the electron and ion beams generated by the device. Simultaneous measurements of the energy spectra for both the electrons and ion beams were measured for the first time as were scaling laws for the increase of electron energy and current with input energy. The potential of the plasma focus as an opening switch was then investigated. Measurements of the current and voltage waveforms indicated that the resistance of the pinch was roughly ten times the classical value which was estimated from electron temperature measurements and streak pictures. To increase the efficiency the impaler concept was devised which could have a transfer effi of well over 50% according to the results of a physical model. The frequency of the microwave emission was measured using the delay line technique. The observed frequencies were most consistent with the lower hybrid frequency. Keywords include: Dense Plasma Focus, Particle Beam Generation, Opening Switch, Load Experiments, Pulsed Power.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A153 061 CONTINUED

AD-A153 017 12/1

original orientation when the co-absorbed species were removed.

DESCRIPTORS: (U) *PHENOLS, *ELECTRODES, ABSORPTION, HYDROGEN, ORIENTATION(DIRECTION), ABSORPTION, ISOTHERMS, ELECTROCHEMISTRY, OXIDATION, PLATINUM, COULOMETERS, CONCENTRATION(CHEMISTRY), REPRINTS, PACKING DENSITY, HYDROGENATION, PLATINUM, OXYGEN

IDENTIFIERS: (U) *Hydroquinone

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Extension of Three Theorems of Fourier Series on the Disc to the Torus.

DESCRIPTIVE NOTE: Technical rept.,

DEC 84 27P

PERSONAL AUTHORS: Miamer, A. ;

REPORT NO. TR-84

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0294

UNCLASSIFIED REPORT

ABSTRACT: (U) The author extends three well-known facts of Fourier series on the disc to Fourier series on the torus, a theorem of Riesz, a theorem of Szego, and the fact that any function in H sub 1 can be factored as the product of two functions in H sub 2. Here the role of negative integers is played by the lattice points in the third quadrant. In earlier extensions of these theorems this role was played by half-planes. Additional keywords: stochastic processes; stationary fields; measures on torus; Fourier coefficients; factorization theorem. (Author).

DESCRIPTORS: (U) *THEOREMS, *FOURIER SERIES, STOCHASTIC PROCESSES, COEFFICIENTS, STATIONARY

IDENTIFIERS: (U) *TORUS, PE61102F, WJAFOSR2304A5

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AD-A153 017

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A153 078

7/4

AD-A153 061

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9/1

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Formation of Vertically Oriented Aromatic Molecules Chemisorbed on Platinum Electrodes: The Effect of Surface Pretreatment with Flat Oriented Intermediates.

84

7P

84

11P

PERSONAL AUTHORS: Hubbard, A. T.; Soriaga, M. P.;

PERSONAL AUTHORS: Chia, V. K. F.; Soriaga, M. P.; Hubbard, A. T.;

CONTRACT NO. AFOSR-81-0149

CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR
TR-85-0330MONITOR: AFOSR
TR-85-0340

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v88 n8 p1089-1094 1984.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v167 p97-106 1984.

ABSTRACT: (U) The adsorption of aromatic compounds on Pt electrodes, pretreated with a layer of flat oriented intermediates at fractional or full coverages, has been studied as a function of concentration. Measurements of packing densities were based on a thin layer electrochemical methods. Four aromatic compounds, previously shown to adsorb on clean electrodes in flat and edge-wise (vertical) orientations depending upon the adsorbate concentration, were studied: hydroquinone, 1,4-naphthohydroquinone, 2,3-dimethylhydroquinone, and 2,5-dimethylhydroquinone. Additional keyword: reprint.

ABSTRACT: (U) The absorption, orientation and electrochemical oxidation of hydroquinone at smooth Pt electrodes in 1M HClO₄ have been studied as a function of electrode potential. Absorption and oxidation measurements were based on thin-layer coulometric methods. The packing density, orientation and reactivity at a given concentration were independent of the potential of absorption in the range of 0.00 V less than E less than 0.50 V. At -0.10 and 0.80 V, the packing densities decreased by about 15%, although the shapes of the T vs. log curves remained unchanged. At extremely negative or positive potentials, the absorbed amounts were significantly lowered; the presence of two distinct Beta plateaus in the absorption isotherms persisted at these potentials, but the transition to higher Beta started at higher concentrations, were typical of edge orientations. The oxidation data also indicated that species absorbed at -0.200 and 0.80 V undergo partial hydrogenation and oxidation, respectively, to an extent which was greater for flat orientations than for edge orientations. The data further suggested that species formed at a given orientation in the presence of adsorbed hydrogen or oxygen retained their original orientation in the presence of adsorbed hydrogen or oxygen retained their

DESCRIPTORS: (U) *CHEMISORPTION, *AROMATIC COMPOUNDS, CONCENTRATION(CHEMISTRY), REPRINTS, QUINONES, ADSORPTION, ELECTRODES, PACKING DENSITY, PLATINUM, MOLECULES

IDENTIFIERS: (U) Hydroquinones, PE61102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A153 088

20/4

HOKENSON (GUSTAVE J) LOS ANGELES CA

(U) Coherent Structure Reflective Turbulent Viscous Flow Modeling.

DESCRIPTIVE NOTE: Final rept. 15 Jan 84-15 Jan 85.

DEC 84 41P

PERSONAL AUTHORS: Hokenson, G. J. ;

REPORT NO. HOK-84-AF-01

CONTRACT NO. F49620-84-C-0014

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-85-0198

UNCLASSIFIED REPORT

ABSTRACT: (U) Utilizing a multiple-element scale/coherence decomposition of the Navier-Stokes equations, the essential characteristics of the large scale turbulent structure are computed in wall-bounded shear flows. The effect of small-scale turbulence structure is modeled and the large-scale turbulence structure is computed assuming weakly non-linear large-scale dynamics. The effects of large-scale non-linearity and the presence of wave-like elements in the flow are accounted for utilizing perturbation theory. The resultant propagation, evolution (in the convected reference frame) and (statistical) occurrence of three-dimensional vertical instabilities are computed and compared to experimental data. Subsequently, coherent reflective turbulence models shall be constructed from this analysis. Keywords include: Fluid dynamics; turbulence; coherent structure.

DESCRIPTORS: (U) *VISCOUS FLOW *TURBULENCE, MATHEMATICAL MODELS, WALLS, SHEAR PROPERTIES, REFLECTION, NONLINEAR SYSTEMS, STRUCTURAL PROPERTIES, NAVIER STOKES EQUATIONS, THREE DIMENSIONAL, FLUID DYNAMICS, COHERENCE, DECOMPOSITION, SCALE, PERTURBATION THEORY

IDENTIFIERS: (U) Shear flow, PE61102F, WUAFOSR2307A2

AD-A153 088

AD-A153 079 7/4 7/3

NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Spectroscopy and Reaction Kinetics of Coordinated Unsaturated Metal Carbonyls.

DESCRIPTIVE NOTE: Annual rept. Oct 83-Oct 84.

NOV 84 5P

PERSONAL AUTHORS: Weltz, E. ;

CONTRACT NO. AFOSR-83-0372

PROJECT NO. 2306

TASK NO. C4

MONITOR: AFOSR
TR-85-0343

UNCLASSIFIED REPORT

ABSTRACT: (U) A program involving the investigation and characterization of reactions of coordinatively unsaturated organometallic species is described. The program emphasizes the measurement of rates of reaction of photolytically produced coordinatively unsaturated species with the parent and rates for cluster formation. Experimental measurements are performed using a time resolved transient absorption apparatus which uses a line tunable CO laser to record spectra and kinetic information by means of probing absorptions in the CO stretch region of the infrared. Systems that have been investigated include coordinatively unsaturated species generated from the Fe(CO)5, Cr(CO)6 and Mn2(CO)10 parents. The results of experiments with these systems are briefly discussed. (Author)

DESCRIPTORS: (U) *SPECTROSCOPY, *REACTION KINETICS, *METAL CARBONYLS, *PHOTOLYSIS, INFRARED SPECTRA, IRON, CHROMIUM, MANGANESE, ABSORPTION, CARBON MONOXIDE LASERS, UNSATURATED HYDROCARBONS, CLUSTERING

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C4

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A153 118 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Robust Tests of Mean Vector in Symmetrical Multivariate Distributions.

DESCRIPTIVE NOTE: Technical rept..

JAN 85 20P

PERSONAL AUTHORS: Giri, N. ; Sinha, B. K. ;

REPORT NO. TR-85-01

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0337

UNCLASSIFIED REPORT

ABSTRACT: (U) This document discusses probability density functions, locally minimax tests, and matrices(mathematics).

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, MINIMAX TECHNIQUE, STATISTICAL DISTRIBUTIONS, MATRICES(MATHEMATICS), PROBABILITY DENSITY FUNCTIONS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A153 118

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AD-A153 115 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) An Inequality and Its Application to the Truncated Distributions.

DESCRIPTIVE NOTE: Technical rept..

FEB 85 13P

PERSONAL AUTHORS: Khattree, R. ; Yin, Y. Q. ;

REPORT NO. TR-85-03

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0347

UNCLASSIFIED REPORT

ABSTRACT: (U) The properties of the truncated distributions for the various families of probability densities have been well discussed in the literature. Also, well known are the expressions for mean, variance and higher order moments of truncated distributions, corresponding to certain families. Johnson and Kotz present an excellent account of these properties almost in every chapter of their four-volume reference work on statistical distributions. This report derives a probability inequality, and then using this inequality, obtain a property of the variance of the subpopulation, obtained by truncating the superpopulation between two points for a certain family of density function bearing some mild conditions. The variance of the univariate truncated distribution increases with the value of the truncation point. Additional keywords: probability density functions. (Author).

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS, NORMAL DENSITY FUNCTIONS, PROBABILITY DENSITY FUNCTIONS, MOMENTS, TRUNCATION

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Adsorption of Aromatic Compounds at Platinum Electrodes. A Comparative Study Illustrating the Deficiencies of Adsorption Measurements Based on Hydrogen Codeposition or Anodic Oxidation.

84

18P

IDENTIFIERS: (U)

Hydroquinone, WUAFOSR2303A1, PE61102F

PERSONAL AUTHORS: Sorlaga, M. P. ; Hubbard, A. T. ;

CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0341

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalysis Chemistry, v167 p79-95 1984.

ABSTRACT: (U) The adsorption of aromatic compounds at smooth polycrystalline Pt electrodes in aqueous 1 M HClO₄ or H₂SO₄ has been investigated using thin-layer coulometry, hydrogen codeposition and anodic oxidation for comparative purposes. Three compounds were studied; hydroquinone, 1,4-dihydroxynaphthalene, and 2,2',5,5'-tetrahydroxybiphenyl; these compounds were previously shown by thin-layer coulometry to adsorb in specific orientational states which depend upon their solution concentrations. The hydrogen codeposition method does not give absolute packing densities, yields wrong fractional coverage data, and provides no indication of orientational transitions. These discrepancies point to severe deficiencies of the latter two methods for measurement of adsorption, and arise from the fact that conversion of hydrogen codeposition or anodic oxidation data to absolute packing densities or adsorbed molecule cross-section requires assumptions which have been proved to be incorrect, at least for aromatic molecules.

DESCRIPTORS: (U) *ADSORPTION, *AROMATIC COMPOUNDS, *ELECTRODES, NAPHTHALENES, BIPHENYL, REPRINTS, MEASUREMENT, OXIDATION, DEPOSITION, HYDROGEN, PLATINUM, PHENOLS, DEFICIENCIES, COULOMETERS

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SEARCH CONTROL NO. EVLO5A

AD-A153 158 12/2

AD-A153 157 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN
OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

(U) Maximum Flow in Planar Networks with Exponentially
Distributed Arc Capacities.

(U) A Trivariate Version of 'Levy's Equivalence.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Technical rept.,

DEC 84 42P

FEB 85 5P

PERSONAL AUTHORS: Kulkarni, V. G. ; Adlakha, V. G. ;

PERSONAL AUTHORS: Simons, G. ;

REPORT NO. UNC/ORSR/TR-84/15

REPORT NO. TR-90

CONTRACT NO. AFOSR-84-0140

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0286

MONITOR: AFOSR
TR-85-0295

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper develops methods for the exact computation of the distribution of the maximum flow and related quantities in a planar network with independent and exponentially distributed arc capacities. A continuous time Markov chain (CTMC) with upper triangular rate matrix and single absorbing state is equal to the value of maximum flow in the network. Recursive algorithms are developed for computing the distribution and moments of the maximum flow. Algorithms are also presented to compute the probability that a given cut is the minimum capacity cut in the network. The algorithms are efficient and computationally stable. Distribution of the maximum flow, given a minimum cut, is studied. Keywords include: Maximum flow; Stochastic networks; Multi-state reliability modeling; Markov chains.

DESCRIPTORS: (U) *NETWORK FLOWS, *EXPONENTIAL FUNCTIONS, ALGORITHMS, MARKOV PROCESSES, STOCHASTIC PROCESSES, STOCHASTIC CONTROL

IDENTIFIERS: (U) WJAFOSR2304A5, PE81102F

AD-A153 158

AD-A153 157

UNCLASSIFIED

ABSTRACT: (U) In a recent paper, the author presents an elementary derivation of a discrete analogue of this result, for a symmetric simple random walk, which he then uses to derive Levy's equivalence. Additional keywords: stochastic processes; distribution functions; Wiener process.

DESCRIPTORS: (U) *VARIATIONS, *STOCHASTIC PROCESSES, SYMMETRY, DISTRIBUTION FUNCTIONS

IDENTIFIERS: (U) *Levys equivalence, Random walk, Wiener process, WJAFOSR2304A5, PE81102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A153 247 12/1

AD-A153 197 13/8 7/4

IBM THOMAS J WATSON RESEARCH CENTER YORKTOWN HEIGHTS NY

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Numerical Methods for Stiff Ordinary and Elliptic Partial Differential Equations.

(U) Studies of Electrodeposition of Silver on an Iodine-Pretreated Stepped Surface: Pt(S)(6(111)x(111)),

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-31 Jan 85,

84 16P

FEB 85 6P

PERSONAL AUTHORS: Solomon, T.; Schardt, B. C.; Rosasco, S. D.; Wleckowski, A.; Stickney, J. L.;

CONTRACT NO. F49620-83-C-0005

CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2304

PROJECT NO. 2303

TASK NO. A3

TASK NO. A1

MONITOR: AFOSR
TR-85-0336MONITOR: AFOSR
TR-85-0334

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The research under this effort was concerned with stable high-order methods for nonlinear stiff systems of ordinary differential equations, relaxation methods for large scale circuit analysis, and fast direct methods for elliptic partial differential equations on general regions. More specifically, the convergence of the discretized version of the wave-form relaxation algorithm was shown under suitable assumptions on the stability of the multistep methods employed and on the strength of the feedback. A new large-scale circuit decomposition was shown to be effective for a large class of digital circuits. In the area of fast direct methods for elliptic partial differential equations, a one parameter family of factored discretizations of the Laplace operator was derived. A variant of the marching method was proposed which is much more stable than the conventional approach and is thus applicable to grids with large numbers of discretization steps in each direction.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *NUMERICAL METHODS AND PROCEDURES, CONVERGENCE, OPERATORS(MATHEMATICS), GRIDS, CIRCUIT ANALYSIS, NONLINEAR SYSTEMS, STIFFNESS, LAPLACE TRANSFORMATION, DECOMPOSITION, ALGORITHMS, RELAXATION, WAVEFORMS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A3

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SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytical Chemistry, v178 p309-323 1984

ABSTRACT: (U) Layers of Ag electrodeposited from aqueous solution onto a Pt(S)(6(111)x(111))(3x1)-1 adlattice formed by pretreatment of the Pt(S)(6(111)x(111)) surface with I₂ vapor were studied by LEED, AES and thermal desorption. Stability of the I adlattice toward exposure to perchloric acid solution, and persistence of I on the surface during multiple cycles of electrodeposition and dissolution of Ag was demonstrated. The I adlattice served to protect the Pt and Ag electrodeposited surfaces from unwanted side reactions. Electrodeposition of Ag occurred in three well-resolved UPD regions. Subsequent UHV experiments, after each UPD peak and up to coverages of a few monolayers, revealed that stable and ordered Ag superlattices were formed, each UPD region leading to a change in LEED pattern and superlattice structure. These results are compared with previous results for smooth, Pt(111), revealing clues as to the role of steps in electrodeposition.

DESCRIPTORS: (U) *PLATINUM, *ELECTRODEPOSITION, *SILVER, IODINE, STABILITY, REPRINTS, CRYSTAL LATTICES, SURFACES, PERCHLORIC ACID

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY

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AD-A153 405 CONTINUED

AD-A153 259 7/4 7/3

square root of 3 unit mesh at intervals 17 Pt unit
vectors divide the surface into hexagonal antiphase
domains.

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *OXIDATION,
*ELECTRODEPOSITION, SILVER, PLATINUM, ARRAYS, ATOMS,
BAROMETRIC PRESSURE, BOUNDARIES, COMPUTATIONS, CONVERSION,
DISTORTION, IODINE, KINEMATICS, OXIDATION, PACKAGING,
PACKING DENSITY, SQUARE ROOTS, STRUCTURAL PROPERTIES,
STRUCTURES, SURFACES, TRANSFORMATIONS, TRANSITIONS,
VACUUM, VAPORS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Influence of Temperature on the Electrocatalytic
Oxidation of Aromatic Compounds Adsorbed on Platinum,

84 5P

PERSONAL AUTHORS: Hubbard, A.T.; Soriaga, M. P.;

CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0332

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry,
v88 p1758-1761 1984.

ABSTRACT: (U) The effect of temperature on the
electrocatalytic oxidation of aromatic compounds (1,4-
dihydroxybenzene and 1,4-dihydroxynaphthalene) adsorbed
on smooth polycrystalline platinum in aqueous solutions
has been investigated. Adsorption occurred spontaneously
when the clean platinum surface was immersed into aqueous
solutions of the aromatic compounds. Analytical
measurements were made by using thin-layer
electrochemical methods. As the temperature was raised
from 5 to 65 C, the extent of oxidation of species bound
in the edgewise orientation was increased considerably.
In contrast to that of species attached in the flat
orientation, which was nearly constant. The oxidation
data suggest that CO₂ is the principal product from flat-
adsorbed species at or above room temperature but that
the product distribution from edge-oriented intermediates
is a sensitive function of temperature.

DESCRIPTORS: (U) *THERMOCHEMISTRY, *OXIDATION, *AROMATIC
COMPOUNDS, *ELECTROCATALYSTS, NAPHTHALENES, BENZENE,
REPRINTS, ADSORPTION, PLATINUM, TEMPERATURE

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A152 887 12/1

AD-A152 879 20/8

TEXAS A AND M UNIV COLLEGE STATION DEPT OF ELECTRICAL
ENGINEERING

GEORGIA UNIV ATHENS DEPT OF PHYSICS AND ASTRONOMY

(U) Alphabet-Constrained Data Compression.

(U) A Study of Excitations during Collisionally-Induced
Electron Detachment of Negative Ions.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Nov 84.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 83-31 Jul 84.

JAN 85 232P

JUL 84 23P

PERSONAL AUTHORS: Gibson, J. D. ; Fischer, T. R. ;

PERSONAL AUTHORS: Menendez, M. G. ; Duncan, M. M. ;

CONTRACT NO. AFOSR-84-0003

CONTRACT NO. AFOSR-83-0264

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. A6

TASK NO. A4

MONITOR: AFOSR
TR-85-0289MONITOR: AFOSR
TR-85-0290

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The alphabet-constrained theory of data compression provides a specific methodology for obtaining explicit data compression system designs, which is in sharp contrast with rate distortion theory and the usual intuitional design methods. Various aspects of alphabet-constrained data compression were investigated, including preposterior analysis, adaptive code generators, vector quantization and the relationships among prediction, quantization and stationarity. Simulations of several coder designs for speech and image sources were performed.

DESCRIPTORS: (U) *CODING, *DATA COMPRESSION, ADAPTIVE SYSTEMS, INFORMATION SYSTEMS, IMAGES, SOURCES, METHODOLOGY, DISTORTION, THEORY, CONTRAST, SHARPNESS, SPEECH

IDENTIFIERS: (U) WUAFOSR2304A6, PE61102F

ABSTRACT: (U) Measurements of the double differential cross sections for the electron detachment of the negative ion of hydrogen upon collision with atomic targets were made around 1 MeV. The double differential cross section at and near zero degrees in the laboratory frame for the single electron detachment was found to account for all of the structure seen in the total (non-specific) double differential cross section. Although quantitative data do not yet exist, it is clear that the double electron detachment process does not contribute significantly to the total double differential cross section at zero degrees. Hence, the non-specific cross sections were used to investigate details of the angular, incident energy, and target dependencies of the structure. The results strongly indicate that a portion of the structure is a manifestation of leaving the final state projectile, the hydrogen atom, in an excited state. A modified version of the electron energy analyzer which permits measurement of Lyman alpha photons coincident with ejected electrons was completed. This version of the analyzer will be used to measure directly the electron energy spectrum coincident with excitation of the hydrogen atom to the 2p state.

DESCRIPTORS: (U) *ELECTRON IMPACT SPECTRA, EXCITATION, DIFFERENTIAL CROSS SECTIONS, ELECTRON ENERGY, HYDROGEN, ANIONS

AD-A152 887

AD-A152 879

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

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IDENTIFIERS: (U) WUAFOSR2301A4, PEG1102F

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ELECTRONIC
SCIENCES LAB

(U) Studies of Optical-Beam Phase-Conjugation by Nonlinear
Refraction.

DESCRIPTIVE NOTE: Annual scientific rept. 3 Dec 82-2 Dec
83,

DEC 84 11P

PERSONAL AUTHORS: Hellwarth, R. W. ;

CONTRACT NO. F49620-83-C-0045

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0283

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of optical beam phase conjugation
by a variety of physical processes and their application
to spectroscopy, gyroscopy, and optical information
processing continued. Keywords include: Coherent Raman
spectroscopy, Photorefraction, Optical resonators, Sodium
vapor, Nonlinear spectroscopy, Resonance light scattering,
Phase conjugation, Fourwave mixing, Nonlinear optics,
Liquid crystals, and Fiber optic gyroscopes.

DESCRIPTORS: (U) *FIBER OPTICS, OPTICAL PROCESSING,
RAMAN SPECTROSCOPY, LIGHT SCATTERING, RESONATORS

IDENTIFIERS: (U) WUAFOSR2301A1, PEG1102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

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AD-A152 827

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NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) A Bilaterally Deterministic rho-Mixing Stationary Random Sequence.

(U) On the Exceedance Point Process for a Stationary Sequence.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept.

FEB 85

17P

JAN 85

23P

PERSONAL AUTHORS: Bradley, R. C. ;

PERSONAL AUTHORS: Hsing, T. ; Leadbetter, M. R.

REPORT NO. TR-91

REPORT NO. TR-89

CONTRACT NO. F49820-82-C-0009

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0348MONITOR: AFOSR
TR-85-0293

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A (non-degenerate) strictly stationary sequence of random variables is constructed such that the p-mixing (maximal correlation mixing) condition is satisfied and each X sub k is measurable with respect to the double-tail sigma-field.

ABSTRACT: (U) It is known that the exceedance points of a high level by a stationary sequence are asymptotically Poisson as the level increases, under appropriate long range and local dependence conditions. When the local dependence conditions are relaxed, clustering of exceedances may occur, based on Poisson positions for the clusters. In this paper a detailed analysis of the exceedance point process is given, and show that, under wide conditions, any limiting point process for exceedances is necessarily compound Poisson. Sufficient conditions are also given for the existence of such a limit. The limiting distributions of extreme order statistics are derived as corollaries. Keywords include: Extreme values; stochastic processes; exceedances; point processes.

DESCRIPTORS: (U) *SEQUENCES(MATHEMATICS), *RANDOM VARIABLES, MEASUREMENT, CONSTRUCTION, CORRELATION, MIXING, STATIONARY

DESCRIPTORS: (U) *SEQUENCES(MATHEMATICS), *CLUSTERING, STOCHASTIC PROCESSES, POISSON DENSITY FUNCTIONS, LIMITATIONS, STATIONARY

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

IDENTIFIERS: (U) Exceedance points, WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY

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AD-A152 802 9/1

CITY COLL NEW YORK DEPT OF MATHEMATICS

TEXAS TECH UNIV LUBBOCK LASER LAB

(U) Inequalities for Distributions with Increasing Failure Rate.

(U) Spark Gap Electrode Erosion.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84.

DEC 84 18P

DEC 84 137P

PERSONAL AUTHORS: Brown, M. ;

PERSONAL AUTHORS: Krompholz, M. ; Kristiansen, M. ;

REPORT NO. CUNY-MB84-01

CONTRACT NO. AFOSR-84-0015

CONTRACT NO. AFOSR-84-0095

PROJECT NO. 2301

MONITOR: AFOSR
TR-85-0291

MONITOR: AFOSR
TR-85-0282

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Inequalities are obtained for IFR (increasing failure rate) distributions. These include bounds on the renewal function for a renewal with IFR interarrival time, and bounds on the quality of exponential approximation to IFR distributions. Keywords include: Inequalities; IFR; IFRA; DMRL; NBU and NBUE distributions; renewal theory; exponential approximations.

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS, *FAILURE, EXPONENTIAL FUNCTIONS, APPROXIMATION(MATHEMATICS), RATES, THEORY

IDENTIFIERS: (U) Inequalities, Renewal theory, IFR(Increasing Failure Rate), NBU distributions, WUAFOSR2304K3, PEG1102F

ABSTRACT: (U) The results of a one-year contract on electrode erosion phenomena are summarized. The arc voltage drop in a spark gap was measured for various electrode, gas, and pressure combinations. A previously developed model of self breakdown voltage distribution was extended. A jet model for electrode erosion was proposed and an experimental arrangement for testing the model was constructed. The effects of inhomogeneities and impurities in the electrodes were investigated. Some of the work described here is scheduled for completion in 1985 under a current grant (AFOSR 84-0032). The areas of investigation described here include: (1) Self breakdown voltage distribution; (2) Electrode erosion; (3) Spark gap voltage recovery. Originator supplied keywords include: Breakdown; Recovery; Electrode; Erosion; Arc voltage; Spark gaps; and JIE(Jet Impact Erosion).

DESCRIPTORS: (U) *ELECTRODES, SPARK GAPS, RECOVERY, VOLTAGE, EROSION, IMPURITIES, BREAKDOWN(ELECTRONIC THRESHOLD)

IDENTIFIERS: (U) *Electrode erosion, JIE(Jet Impact Erosion), PEG1102F, WUAFOSR2301A7

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AVCO EVERETT RESEARCH LAB INC EVERETT MA

BRIGHAM YOUNG UNIV PROVO UT COMPUTER AIDED MFG LAB

(U) Experimental Study of Dissociative Attachment in
Optically-Pumped Lithium Molecules.

(U) Manufacturing Information System.

DESCRIPTIVE NOTE: Final rept. 1 Mar-31 Oct 84,

DESCRIPTIVE NOTE: Final rept. 1 Jul 82-31 Oct 84.

JAN 85 28P

DEC 84 258P

PERSONAL AUTHORS: McGeoch, M. W.; Schlier, R. E.;

PERSONAL AUTHORS: Allen, D. K.; Smith, P. R.; Smart, M. J.;

CONTRACT NO. F49620-84-C-0044

CONTRACT NO. AFOSR-82-0253

PROJECT NO. 2301

PROJECT NO. 2305

TASK NO. A7

TASK NO. K1

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0284

TR-85-0275

UNCLASSIFIED REPORT

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ABSTRACT: (U) The first experimental observations of dissociative attachment in lithium dimmer molecules are presented. Lithium molecules are optically pumped via the Li₂(B) electronic state into selected levels of the ground electronic state. Low energy electrons are created by two-step laser photoionization of lithium atoms. Product Li⁺ ions are detected by time-of-flight spectrometry. Preliminary analysis of the data gives a rate constant of 3×10^{-10} to the 8th power cc/sec for the attachment of 0.1 eV electrons to lithium vibrational states $v = 8$ to $v = 12$. Without strong dependence on the selected states. Originator-supplied keywords include: Dissociative Attachment.

DESCRIPTORS: (U) *MOLECULAR ASSOCIATION, *LITHIUM, *MOLECULES, *OPTICAL PUMPING, ATTACHMENT, DISSOCIATION, ELECTRONIC STATES, GROUND STATE, IONS, ATOMS, ELECTRONS, LOW ENERGY, SPECTROMETRY, PHOTOIONIZATION

IDENTIFIERS: (U) Dissociative attachment, PE61102F, WUAFOSR2301A7

ABSTRACT: (U) This is the final report of a project to develop prototype miniature laboratory apparatus to be used in conducting a series of experiments and investigations relating to a Manufacturing Information System. The size and cost of manufacturing equipment has made it extremely difficult to perform a realistic modeling and simulation of the manufacturing process in university research laboratories. Likewise the size and cost factors, coupled with many uncontrolled variables of the production situation has even made it difficult to perform adequate manufacturing research in the industrial setting. The difficulty of developing integrated Manufacturing Systems is well documented by the large amount of funding and effort being spent by industry and government. It was the purpose for research funded under this grant to continue the development of miniature prototype equipment for use in an integrated CAD/CAM Laboratory. The equipment developed under this grant and from previous work is capable of actually performing production operations (e.g. drilling, milling, turning, punching, etc.) on metallic and non-metallic workpieces. It is now expected that the prototype equipment developed or otherwise acquired under this grant will now provide the basis for extensive research on Manufacturing Information Systems, Common Database Development, CIM Application Program Development, Local Area Networking, and Knowledge-based CAD/CAM Training utilizing Interactive Videodisc Delivery Systems. Originator-

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supplied keywords included: Manufacturing, Integrated, Information, Flexible, Distributed, System, Assembly Language, Computer Programs, Mechanical Drawing.

DESCRIPTORS: (U) *COMPUTER AIDED MANUFACTURING, *MANAGEMENT INFORMATION SYSTEMS, *INDUSTRIAL ENGINEERING, *DISTRIBUTED DATA PROCESSING, INDUSTRIAL PRODUCTION, ROBOTICS, DRILLING, MILLING MACHINES, MACHINE TOOLS, CONTROL SYSTEMS, MECHANICAL DRAWING, DATA BASES, COSTS, COMPUTER PROGRAMS, SETTING(ADJUSTING), DISK RECORDING SYSTEMS, SIMULATION, MINIATURIZATION, PROTOTYPES, ASSEMBLY LANGUAGES

IDENTIFIERS: (U) WJAFOSR2305K1, PE81102F

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Rotational Relaxation Studies of Hydrogen Fluoride.

DESCRIPTIVE NOTE: Final summary rept. 1 Jun 83-31 Dec 84.

FEB 85 28P

PERSONAL AUTHORS: Hinchey, J. J. ;

REPORT NO. UTRC/R85-956539-1

CONTRACT NO. F49620-83-C-0098

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-85-0302

UNCLASSIFIED REPORT

ABSTRACT: (U) Two double laser resonance experiments of collisional hole filling and vibration to rotation transfer have been used to determine rotational relaxation rates for hydrogen fluoride. The rates for rotational levels J2 through J14 range from 55,000,000/sec/torr to 2,000,000 sec/torr and these results are described by kinetic rate models. The rates increase with temperature by about 20 percent 300 K and 1000 K. The effect of several added gases on the rates has been measured. Vibration to rotation transfer proceeds by the accepted vibrational relaxation rate. A significant fraction of V=1 population is transferred with about 35 percent passing through the levels J10 - J14 of V=0. Originator-supplied keywords include: Relaxation rates, V-R transfer, Hydrogen fluoride, Rotational population transfer, and Chemical lasers.

DESCRIPTORS: (U) *RELAXATION TIME, *HYDROGEN FLUORIDE, MOLECULAR ROTATION, MOLECULAR VIBRATION, COLLISIONS, ENERGY LEVELS, RESONANCE, HOLES(ELECTRON DEFICIENCIES), FILLING, CHEMICAL LASERS, REACTION KINETICS, TRANSFER

IDENTIFIERS: (U) WJAFOSR2303B1, PE81102F

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PITTSBURGH UNIV PA DEPT OF PHYSICS AND ASTRONOMY

(U) Studies of Equatorial 630.0 nm Airglow Enhancements
Produced by a Chemical Release in the F-Region.

84 8P

determined from optical doppler shifts less than an hour
earlier.

DESCRIPTORS: (U) *AIRGLOW, *CARBON DIOXIDE, *F REGION,
PHOTOMETRY, CHARGE TRANSFER, REPRINTS, MOLECULES, ATOMS,
BRIGHTNESS, RELEASE, OXYGEN, MOLECULAR IONS

PERSONAL AUTHORS: Biondi, M. A.; Sipler, D. P. ;

IDENTIFIERS: (U) PEB1102F, WUAFOSR2310A2

CONTRACT NO. AFOSR-82-0055

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-85-0300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Planet Space Science, v32 n12
p1605-1610 1984.

ABSTRACT: (U) A sky-mapping filter photometer has been used to determine the 630.0 nm airglow enhancement produced by explosive release of 3×10 to the 26th power carbon dioxide molecules into the F-region at 320 km altitude on 8 September 1982 as part of project BIME. The enhancement is produced when carbon dioxide molecules engage in atom transfer with the F-region oxygen ions to form molecular oxygen(+) ions, which subsequently dissociatively recombine with the ambient electrons to produce O(1D) atoms to yield the 630.0 nm radiation. The morphology of the enhanced airglow region has been traced in a series of 630.0 nm intensity contour maps as a function of time, the enhancement reaching a central brightness of approximately 400 R about 2 min after release and a diameter of about 250 km some 3 min after release. The measurements of central intensity and enhanced region radius as a function of time are compared with model calculations by Mendillo and Herniter of diffusive expansion of carbon dioxide molecules from either a point release or from an initial, extended volume. While peak intensities are reasonably reproduced, the measured decay of the 630.0 nm intensity and the growth in size of the enhanced region are rather different from the model predictions. The measured 200 m/s drift southeastward of the enhanced region is consistent with the motion of the neutral thermosphere

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

MEDICAL RESEARCH INST OF SAN FRANCISCO CA

(U) Silacycloprenes. 3. Palladium-Catalyzed Insertion Reactions.

(U) The Origin of Brain Potentials Associated with Selective Visual Attention.

85 7P

DESCRIPTIVE NOTE: Annual scientific rept. 1 Sep 83-31 Aug 84.

PERSONAL AUTHORS: Seyferth, D. ; Shannon, M. L. ; Vick, S. C. ; Lim, T. F. O. ;

NOV 84 6P

CONTRACT NO. AFOSR-83-0003

PERSONAL AUTHORS: Nakayama, K. ; Mackeben, M. ;

PROJECT NO. 2303

CONTRACT NO. AFOSR-83-0320

TASK NO. B2

PROJECT NO. 2313

MONITOR: AFOSR
TR-85-0301MONITOR: AFOSR
TR-85-0246

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics. v4 p57-62 1985.

UNCLASSIFIED REPORT

ABSTRACT: (U) Bis(triphenylphosphine)palladium dichloride was found to catalyze two types of process with 1,1-dimethyl-2,3-bis(trimethylsilyl)silirene: 1) formal dimethylsilylene extrusion follow by trapping of this species by unsaturated organic species that are present; 2) insertion of unsaturated substrates into the silirene ring. Such catalyzed reactions with terminal acetylenes, allenes, and some terminal 1,3 dienes are described. Originator-supplied keywords include: Silacycloprenes, Organosilicon synthesis, Insertion reactions, and Transition Metal catalysis.

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) This study is designed to find the origins of electrical signals generated by the brain in association with selective visual attention. A series of behavioral and electro-physiological tests on humans as well as on trained, alert monkeys is proposed and progress in pursuit of the stated goal is reported. Originator supplied keywords include: Monkey, P300(brain wave), and Current source density analysis.

DESCRIPTORS: (U) *PROPENES, *ADDITION REACTIONS, *SILICON COMPOUNDS, *CATALYSIS, PALLADIUM, PHENYL RADICALS, PHOSPHINE, CHLORIDES, METHYL RADICALS, REPRINTS

DESCRIPTORS: (U) *BRAIN, *ELECTROPHYSIOLOGY, *VISION, *ATTENTION, SIGNAL PROCESSING, ELECTROENCEPHALOGRAPHY, HUMANS, MONKEYS

IDENTIFIERS: (U) Insertion reactions, Silirenes, Sillylenes, PE61102F, WUAFOSR230382

IDENTIFIERS: (U) *Evoked potential, PE61102F, WUAFOSR2313AS

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RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MECHANICAL INDUSTRIAL AND AEROSPACE ENGINEERING

(U) Theoretical Investigation of Three-Dimensional Shock
Wave Turbulent Boundary Layer Interactions. Part 3.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 83-30 Sep 84.

DEC 84 52P

PERSONAL AUTHORS: Knight, D. D. ;

REPORT NO. RU-TR-162-MIAE-F

CONTRACT NO. AFOSR-82-0040

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-85-0280-PT-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 2. AD-A138 722.

ABSTRACT: (U) The focus of the research effort is the understanding of three-dimensional shock wave-turbulent boundary layer interactions. The approach uses the full mean compressible Navier-Stokes equations with turbulence incorporated through the algebraic turbulent eddy viscosity model of Baldwin and Lomax. This year's principle accomplishments are (1) the Baldwin-Lomax model was evaluated for a series of non-separated two-dimensional turbulent boundary layers. (2) the 3-D Navier-Stokes codes was rewritten into CYBER 200 FORTRAN. (3) the computed results for the 3-D sharp fin alpha sub g = 10 deg were compared with the results of a separate calculation by C. Horstmann using the k-epsilon turbulence model and the experimental data of McClure and Dolling. and (4) the 3-D sharp fin at alpha sub g = 20 deg was computed, and the results compared with the available experimental data. The examination of the flowfield structure of the 3-D sharp fin at alpha sub g = 20 deg was initiated. Originator supplied keywords include: High speed flows; Viscous-Inviscid interactions; Shock-boundary layer interactions; Computational fluid dynamics; Navier-Stokes equations; and Turbulence.

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DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *SHOCK WAVES, *TURBULENCE, FLOW FIELDS, HIGH VELOCITY, THEORY, COMPUTATIONS, FLUID DYNAMICS, NAVIER STOKES EQUATIONS, INTERACTIONS, INVISCID FLOW, VISCOUS FLOW, THREE DIMENSIONAL, MATHEMATICAL MODELS, TWO DIMENSIONAL, SHARP BODIES, FINS, FORTRAN, DIGITAL SIMULATION

IDENTIFIERS: (U) Computational fluid dynamics, Sharp fins, Shock boundary layer interactions, PE61102F, WUAFOSR2307A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A152 197 20/1

AD-A152 187 7/4

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

CALIFORNIA UNIV DAVIS DEPT OF WATER SCIENCE AND ENGINEERING

(U) Research and Development of Subsurface Acoustic Wave Devices for Sensor Applications.

(U) Vibrational Relaxation of N₂(A Cubed Sigma(+)) sub u, v = 1,2,3).

DESCRIPTIVE NOTE: Final rept. 30 Nov 83-31 Jan 85,

NOV 83 6P

JAN 85 59P

PERSONAL AUTHORS: Cullen, D. E.; Grudkowsk, T. W. ;

PERSONAL AUTHORS: Thomas, J. M.; Jeffries, J. B.; Kaufman, F. ;

REPORT NO. UTRC/R85-926871

CONTRACT NO. AFOSR-80-0207

CONTRACT NO. F49620-84-C-0006

PROJECT NO. 2303

PROJECT NO. 2305

TASK NO. B1

TASK NO. 05

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0260

TR-85-0156

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Surface skimming bulk waves (SSBW) in quartz were examined for sensor applications. Sensitivities to substrate strains, temperature, and fluid immersion were determined for AT and BT-cut quartz. The application of a strain sensitive SSBW device configuration as a fluid damped, cantilever beam accelerometer was investigated. This program has resulted in the discovery of an SSAW mode with properties that are extremely well suited to the development of acoustic wave sensors. Originator-supplied keywords include: Surface Skimming Bulk Waves (SSBW), SSBW sensors, and SSBW strain sensitivity.

DESCRIPTORS: (U) *ACOUSTIC DETECTORS, *ACOUSTIC EQUIPMENT, ACOUSTIC WAVES, CANTILEVER BEAMS, QUARTZ, DETECTORS, WAVE PROPAGATION, IMMERSION, SUBSURFACE

IDENTIFIERS: (U) P:81102F, WUAFOSR2305B2

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v102 n1 p50-53, 11 Nov 83.

ABSTRACT: (U) N₂ (A, v=0-3) produced by the Ar(3P_{o2}) + N₂ reaction and detected by laser-induced fluorescence undergoes rapid, stepwise vibrational relaxation but slow electronic quenching with added CH₄ or CF₄. Rate constants, K superscript v subscript Q of 1.5, 3.1, and 5.0 X 10 to the -12th power cc/s are measured for Q=CH₄, v=1-3, and 0.47, 1.8, and 5.5 X 10 to the -12th power cc/s for Q=CF₄, v=1-3, with approx + or - 20% accuracy sigma. Information is also obtained for the unrelaxed, relative v populations. Originator supplied keywords include: Laser-Induced Fluorescence, Vibrational Relaxation, Electronic Quenching.

DESCRIPTORS: (U) *QUENCHING, *RELAXATION, *VIBRATION, POPULATION, CONSTANTS

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F

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CALIFORNIA STATE UNIV NORTHRIDGE DEPT OF GEOLOGICAL SCIENCES

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Inversion of Rayleigh Wave Group Velocities from High-Explosive Tests.

(U) Some New Estimation Methods for Weighted Regression When There are Possible Outliers.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Final rept. Apr 82-31 Mar 83.

JAN 85 31P

JAN 85 31P

PERSONAL AUTHORS: Simila,G. W. ;

PERSONAL AUTHORS: Giltinan,D. M. ; Carroll,R. J. ; Ruppert,D. ;

CONTRACT NO. AFOSR-82-0138

REPORT NO. MIMED-SER-1571

PROJECT NO. 2309

CONTRACT NO. F49620-82-C-0009, NSF-MCS81-00748

TASK NO. D9

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0278

TASK NO. A5

MONITOR: AFOSR
TR-85-0264

UNCLASSIFIED REPORT

ABSTRACT: (U) Rayleigh-wave group-velocity have been obtained by the moving window analysis of high-explosive ground motion records at McCormick Ranch, Kirtland AFB. Fundamental mode velocities (225 to 264 m/s) were determined for the period range 50-160 ms at a recording distance of 229 m. Also, higher mode dispersion was observed for periods 25-60 ms with group velocities of 280-305 m/s. Possible spall phase dispersion was observed at distances of 11-38 m. Seismic refraction surveys provided initial model parameter for the test site. An iterative inversion method was used to estimate the shear velocity distribution. Constant layer thickness and attenuation values equal 50-100 were additional initial constraints. Inversion results yielded a shear-wave velocity model of 245-610 m/s to a depth of 24 m at McCormick Ranch. Originator-supplied keywords include: Rayleigh wave, group velocity, and high explosive tests.

DESCRIPTORS: (U) *HIGH EXPLOSIVES, *TEST METHODS, *RAYLEIGH WAVES, GROUND MOTION, INVERSION, ITERATIONS, MOTION, WINDOWS, VELOCITY, REFRACTION, SHEAR PROPERTIES

IDENTIFIERS: (U) WUAFOSR2309D9, PE61102F

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IDENTIFIERS: (U) Robustness, Outliers, WUAFOSR2304A5.

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ABSTRACT: (U) The problem of estimating the variance parameter robustly in a heteroscedastic linear model is considered. The situation where the variance is a function of the explanatory variables is treated. To estimate the variance robustly in this case, it is necessary to guard against the influence of outliers in the design as well as outliers in the response. By analogy with the homoscedastic regression case, two estimators are proposed which do this. Their performance is evaluated on a number of data sets. The authors had considerable success with estimators that bound the self-influence, that is, the influence on observation has on its own fitted value. The authors conjecture that in other situations, for example, homoscedastic regression, bounding the self-influence will lead the estimators with good robustness properties. Additional keywords: Air Force research; and Mathematical models. (Author)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *ESTIMATES, *NUMERICAL METHODS AND PROCEDURES, *REGRESSION ANALYSIS, AIR FORCE RESEARCH, WEIGHTING FUNCTIONS, PARAMETERS, VARIATIONS, VARIABLES

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PE61102F

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL
LABS

(U) A Study of the Time Dependence in Fracture Processes
Relating to Service Prediction of Adhesive Joints and
Advanced Composites.

DESCRIPTIVE NOTE: Final technical rept. 15 Aug 83-30 Jun
84.

JUN 84 204P

PERSONAL AUTHORS: Knauss, W. G. ;

REPORT NO. GALCIT-SM-84-10

CONTRACT NO. AFOSR-81-0127

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR
TR-85-0239

UNCLASSIFIED REPORT

ABSTRACT: (U) Problems related to fracture of bonded structures and composites were studied with emphasis on the time dependence of the failure process. Three subject areas in these theses are identified: (a) Residual stresses due to changes in temperature through the glass transition range. It is found that determination of the creep compliance or of the relaxation modulus is the most important material property for accurate stress determination general experimental and analytical agreement prevails. (b) In temperature 'accelerated' crack propagation tests along interfaces it is found that crack propagation stops upon raising the temperature. The reason for this 'unexpected' behavior is that with raising the temperature the elimination of residual stresses overcomes the reduction of viscosity so that crack arrest becomes possible. (c) Fatigue crack propagation is studied for a viscoelastic material. In contrast to metals the rate of crack growth per cycle is strongly affected by the frequency, declining with increasing frequency. However, the average velocity (cm/sec) per cycle increases with frequency. Thus it is more important to consider the time under stress than merely

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the number of cycles.

RESEARCH INST OF COLORADO FORT COLLINS

DESCRIPTORS: (U) *ADHESIVE BONDING, *BONDED JOINTS,
*COMPOSITE MATERIALS, *TIME DEPENDENCE, CREEP, CRACK
PROPAGATION, FRACTURE(MECHANICS), RESIDUAL STRESS, THESES,
VISCOELASTICITY, PREDICTIONS, STRESSES

(U) High Efficiency Transverse D. C. Electron Beams.

DESCRIPTIVE NOTE: Final scientific rept. 1 Aug 83-31 Jul 84.

IDENTIFIERS: (U) PE61102F, WUAFOSR230782

OCT 84 57P

PERSONAL AUTHORS: Collins, G. ;

REPORT NO. RIC-247

CONTRACT NO. AFOSR-83-0287

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0242

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposed new sintered metal oxide-metal (e. g. Al2O3-Mo) cathodes were tested. As originally predicted these cathode materials produce high current beams (1A) at multikilowatt powers in atmospheres containing a pure novel gas or a mixture of a novel gas and a metal vapor at generation efficiencies up to 75%. In contrast with other cathode materials previously used, the sintered materials allow multikilowatt electron beam operation in an oxygen free atmosphere. This is an important development in the construction of an cw electron beam excited UV laser, where no oxygen can be tolerated. These new electron guns developed for laser excitation find also important applications in other areas of research, such as the processing of microelectronic materials. Keywords include: High efficiency transverse D.C. electron beams.

DESCRIPTORS: (U) *ELECTRON BEAMS, *LASERS, CATHODES, MATERIALS, OPERATION, ELECTRON GUNS, ATMOSPHERES, OXYGEN, SINTERING, METAL VAPORS, MICROELECTRONICS, PROCESSING

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1

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AD-A152 027 CONTINUED

TUFTS UNIV MEDFORD MA DEPT OF PHYSICS

(U) Very Large Array Observations of Coronal Loops and
Related Observations of Solar Type Stars.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Jan-31 Dec 84,

IDENTIFIERS: (U) Solar bursts, WUAFOSR2311A1, PE61102F

JAN 84 118P

PERSONAL AUTHORS: Lang, K. R. ;

CONTRACT NO. AFOSR-83-0019

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-85-0256

UNCLASSIFIED REPORT

ABSTRACT: (U) Observations of solar active regions with the Very Large Array (V.L.A.) led to a new understanding of the origin and prediction of the solar bursts which disrupt communication systems and interfere with high-flying aircraft. The V.L.A. was used to delineate the temperature and magnetic structure at different heights in coronal loops, and the magnetic field strength was also determined. Much of the visible solar disk was resolved at 20 cm wavelength with 2.6 in. angular resolution. Snapshot maps at intervals of 3 seconds were used to specify changes in the temperature and the magnetic field before and during solar bursts. These snapshot maps were used to investigate the flow of plasma within coronal loops during solar bursts. Postflare loop systems were similarly investigated. Our V.L.A. observations provided new information on coronal heating and emerging magnetic loops that may trigger the emission of solar bursts. Keywords include: Coronal loops - Radio radiation, Polarization, Evolution, Temperature, Density, Magnetic field, Thermal cyclotron lines, Very large array, Solar bursts - Origin, Prediction, Preburst heating, Changing magnetic fields, Coherent maser-like emission, Flare build-up, Nearby stars - Coronae, Bursts, Slowly varying emission, International ultraviolet explorer satellite.

DESCRIPTORS: (U) *SOLAR ACTIVITY, *SOLAR CORONA, *SOLAR

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A151 888 6/16 5/10 12/1

DESCRIPTORS: (U) *VISION, *MOTOR REACTIONS,
*ELECTROENCEPHALOGRAPHY, ADULTS, MALES, QUANTITATIVE
ANALYSIS, CEREBRAL CORTEX, CIRCADIAN RHYTHMS, PATTERNS,
FLIGHT SIMULATION, PERFORMANCE(HUMAN), VISUAL PERCEPTION

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF PSYCHOLOGY
(U) Vision Algorithms and Psychophysics.

DESCRIPTIVE NOTE: Annual scientific rept. 15 Jul 83-14
Jul 84.

IDENTIFIERS: (U) Parietal lobe, Occipital lobe.
WUAFOSR2313A4, PE61102F

SEP 84 24P

PERSONAL AUTHORS: Richards, W. A. ;

CONTRACT NO. F49620-83-C-0135

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-85-0248

UNCLASSIFIED REPORT

ABSTRACT: (U) Vision by man or machine is the useful symbolic descriptions form images of the world. Studies of human visual system provide valuable insights into the kinds of descriptions that will be the most useful, but little insight into the computational problems involved in deriving and manipulating these descriptions. This research examines several computational problems associated with aspects of two- and three-dimensional vision. The solution to these problems includes the design and implementation of particular algorithms. Their efficiency and flexibility is compared with that of the human visual processor. Keywords include: Image understanding, Visual pattern recognition, Visual algorithms, Human vision, Biological information processing.

DESCRIPTORS: (U) *ALGORITHMS, *VISION, *PSYCHOPHYSICS,
TWO DIMENSIONAL, COMPUTATIONS, HUMANS, IMAGES, PATTERN
RECOGNITION, VISUAL PERCEPTION, INFORMATION PROCESSING,
THREE DIMENSIONAL

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5

AD-A151 901

AD-A151 888

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A151 902 20/8 7/5 7/4

AD-A151 901 8/16 5/10

SRI INTERNATIONAL MENLO PARK CA

CALIFORNIA UNIV LOS ANGELES DEPT OF ANATOMY

(U) Kinetics and Structure of Excited States.

(U) Measurement and Modification of Sensory System EEG (Electroencephalographic) Characteristics during Visual-Motor Performance.

DESCRIPTIVE NOTE: Final rept..

JAN 85 10P

DESCRIPTIVE NOTE: Annual rept. 30 Sep 83-29 Sep 84.

PERSONAL AUTHORS: Gallagher, T. F. ;

OCT 84 18P

REPORT NO. SRI-MP-85-005

PERSONAL AUTHORS: Sterman, M. B. ;

CONTRACT NO. F49620-79-C-0212

CONTRACT NO. AFOSR-82-0335

PROJECT NO. 2301

PROJECT NO. 2313

TASK NO. A4

TASK NO. A4

MONITOR: AFOSR
TR-85-0257MONITOR: AFOSR
TR-85-0247

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research program was to reach an understanding of excited atom processes by a systematic experimental study of their spectroscopy, interactions with strong fields, and collisions. The method used is laser excitation of excited atoms in conjunction with a variety of state selective detection techniques developed in our laboratory. Although it is unusual to study spectroscopy and collisions in the same research program, it has proved to be a very enlightening approach. The following section of this report summarizes the accomplishments. For reference, a list of the scientific papers published under this contract is included. These papers embody the main conclusions of our study.

DESCRIPTORS: (U) *REACTION KINETICS, *ELECTRONIC STATES, *ATOMS, *LASERS, INTERACTIONS, COLLISIONS, EXCITATION

IDENTIFIERS: (U) LPN-SRI-PYU-8702, WUAFOSR2301A4, PEG1102F

AD-A151 902

AD-A151 901

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ABSTRACT: (U) Electroencephalographic (EEG) and performance measures were obtained from eight adult male subjects during a sequence of 18 trials over a six-hour period consisting of alternating performance and non-performance epochs in a flight simulation task. EEG data were subjected to a limited bandpass frequency analysis. Task engagement (performance) was associated with greater density in central cortical rhythmic patterns, while a reciprocal decrease was observed in parietal-occipital activity. The opposite relationship was observed during non-performance segments, with density greater in parietal-occipital data. This reciprocity was most consistent in the central 8-11 Hz and parietal-occipital 4-7 Hz bands. EEG activity from these two areas was also found to be modulated over time, with linear trends related to performance epochs. Central rhythmic activity tended to increase progressively over trials in performance epochs while parietal-occipital patterns showed the opposite trend. Parietal-occipital activity was greatest during non-performance epochs and both areas showed an in-phase periodic pattern, with a cycle duration approximating 90 minutes. Originator-supplied keywords: Visual motor performance, EEG correlates of performance, Quantitative analysis, Ultradian rhythms, Somatosensory EEG, Performance prediction, Response accuracy and speed, Periodicity.

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AD-A151 912 21/2

AD-A151 912 CONTINUED

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) High Temperature Catalytically Assisted Combustion.

DESCRIPTIVE NOTE: Final rept. 1 Aug 81-31 Jul 83.

JUL 83 89P

PERSONAL AUTHORS: Bracco, F. V.; Royce, B. S. H.;
Santavica, D. A.; Stein, Y.;

CONTRACT NO. AFOSR-81-0248

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0259

UNCLASSIFIED REPORT

ABSTRACT: (U) Results of research on a two dimensional, transient catalytic combustion model and on a high temperature perovskite catalyst are presented. A recently developed two dimensional, transient model has been used to study the ignition of carbon monoxide/air mixtures in a platinum coated catalytic honeycomb. Comparisons between calculated and measured steady state substrate temperature profiles and exhaust gas compositions show good agreement. A platinum doped perovskite catalyst has been proposed which will exhibit low temperature light off and high temperature stability. Preliminary tests using a perovskite powder with one percent by weight platinum are encouraging, showing very little change in surface activity when used with propane fuel. Variations in catalytic activity from sample to sample have also been found and after extensive testing the cause of these variations have not been identified. However, preliminary tests using Fourier transform infrared photoacoustic spectroscopy do indicate differences in the various catalyst samples that may be related to the difference in catalytic activity. The use of bench top oven and differential scanning calorimetry techniques for screening catalysts in terms of relative activity and aging characteristics has also been demonstrated. Originator-supplied keywords include: Catalytic combustion, and Perovskite catalysts.

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DESCRIPTORS: (U) *COMBUSTION, *CATALYSTS, COMPUTATIONS, FOURIER TRANSFORMATION, FOURIER SPECTROSCOPY, AIR, CARBON MONOXIDE, MIXTURES, HIGH TEMPERATURE, THERMAL STABILITY, CALORIMETRY, SCANNING, LOW LIGHT LEVELS, LOW TEMPERATURE, PEROVSKITES, HONEYCOMB STRUCTURES, METAL COATINGS, PLATINUM, POWDERS, PROPANE, MODELS, TWO DIMENSIONAL

IDENTIFIERS: (U) Photoacoustic spectroscopy.
WUAFOSR2308A2, PE61102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A151 920 17/9

AD-A151 915 12/1

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL
ENGINEERING AND COMPUTER SCIENCES

FLORIDA STATE UNIV TALLAHASSEE

(U) Evaluation Radar Detection Probabilities by Steepest
Descent Integration.

(U) Stochastic Versions of Rearrangement Inequalities.

SEP 84 12P

84 10P

PERSONAL AUTHORS: Helstrom, C. W. ; Ritcey, J. A. ;

PERSONAL AUTHORS: D'Abadie, C. ; Proschan, F. ;

CONTRACT NO. AFOSR-82-0343

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0265

TR-85-0267

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Aerospace and Electronic Systems, VAES-20 n5 p824-834 Sep
84.

SUPPLEMENTARY NOTE: Pub. in Inequalities in Statistics
and Probability, IMS Lecture Notes-Monograph Series, v5
p4-12 1984.

ABSTRACT: (U) The probability of detection for radars
employing noncoherent integration and a fixed threshold
or cell-averaging constant false alarm rate (CA-CFAR)
processor is computed by nonfluctuating and chi-squared
fluctuating targets. A bound on the truncation error
allows for a simple stopping rule for the numerical
integration. The method has applicability to many
problems in radar detection theory.

ABSTRACT: (U) This paper develops a unified way of
obtaining stochastic versions of deterministic
rearrangement inequalities. Rearrangement inequalities
compare the value of a function of vector arguments with
the value of the same function after the components of
the vectors were rearranged. The classical example of a
rearrangement inequality is the well-known inequality of
Hardy, Littlewood, and Polya for sums of products. The
function sigma is an example from a class of functions
called arrangement increasing functions for which such
rearrangement inequalities hold. We present a number of
examples of densities which satisfy the condition.

DESCRIPTORS: (U) *RADAR, *DETECTION, THRESHOLD EFFECTS,
NUMERICAL INTEGRATION, PROBABILITY, ALLOYS, ERRORS,
TRUNCATION, INCOHERENCE, INTEGRATION, PROBABILITY, THEORY

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *INEQUALITIES,
REPRINTS, FUNCTIONS(MATHEMATICS)

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

IDENTIFIERS: (U) *Rearrangement inequalities,
WUAFOSR2304A5, PE81102F

AD-A151 920

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SEARCH CONTROL NO. EVL05A

AD-A151 958

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AD-A151 922 8/13

YALE UNIV NEW HAVEN CONN

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Population Inversion in Laser-Initiated Vacuum Arcs.

(U) A Computer Program for Consolidation and Dynamic Response Analysis of Fluid-Saturated Media.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 84-31 Jan 85.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-31 Jan 84.

JAN 85

54P

JUN 83

122P

PERSONAL AUTHORS: Krishnan, M. ;

PERSONAL AUTHORS: Aboustit, B. L. ; Sandhu, R. S. ; Hong, S. J. ; Hireath, M. S. ;

CONTRACT NO. AFOSR-81-0077

PROJECT NO. 2301

REPORT NO. OSURF-715107-84-5

TASK NO. A8

CONTRACT NO. AFOSR-83-0055

MONITOR: AFOSR
TR-85-0258

PROJECT NO. 2307

TASK NO. C1

UNCLASSIFIED REPORT

ABSTRACT: (U) A detailed study of resonant photo-excitation of CII ions in a vacuum arc discharge by line radiation from laser produced, AIIII ions was completed. Although enhanced fluorescence by up to a factor of eight in CII at 2138 A was observed, the collisional-radiative kinetics are such as to prevent a population inversion from building up under the conditions of the experiments. This unfavorable conclusion prompted the identification of a new class of Be-like, photo-excited lasers with potential laser wave-lengths from 2177 A in CIII down to 230 A in MgIX. Design considerations for such lasers are presented. Initial experiments in CIII pumped by MnVI line radiation have shown fluorescence enhancements in CIII at 2177 A by up to a factor of 150. Optimization of the pump plasma geometry has increased this enhancement to a factor of 500. Gain estimates are given which suggest that a laser can be constructed at 2177 A. Originator supplied keywords include: Short wavelength lasers, X-ray lasers, Vacuum arcs, Laser plasmas.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, CARBON DIOXIDE LASERS, EXCITATION, LASER BEAMS, LASER PUMPING, WAVE PROPAGATION, X RAYS

IDENTIFIERS: (U) X-ray lasers, PE61102F, WUAFOSR2301A8

AD-A151 958

AD-A151 922

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UNCLASSIFIED REPORT

ABSTRACT: (U) A computer program was developed for evaluation of finite element models for soil consolidation and study of dynamic response of fluid-saturated soils. One- and two-dimensional consolidation problems were analyzed using different finite elements. Transient response of saturated porous elastic media for dynamic as well as quasi-static problems was studied. Results were compared with the numerical and analytical solutions available. Keywords include: Computer simulation, Consolidation, Dynamic response, Finite element method flow through porous media seepage seismic response.

DESCRIPTORS: (U) *SOIL MECHANICS, SOILS, FLUIDS, COMPUTER PROGRAMS, DYNAMIC RESPONSE, FINITE ELEMENT ANALYSIS, NUMERICAL ANALYSIS, ELASTIC PROPERTIES, POROUS MATERIALS, SATURATION, COMPUTERIZED SIMULATION, FINITE ELEMENT ANALYSIS, MATHEMATICAL MODELS, TRANSIENTS

IDENTIFIERS: (U) Soil consolidation, PE61102F, WUAFOSR2307C1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A151 968 CONTINUED

AD-A151 959 20/5

IDENTIFIERS: (U) Motion detection, Webers law, Power law,
PE61102F, WUAFOSR2313A5

SCHAFER (W J) ASSOCIATES INC ARLINGTON VA

(U) Short Wavelength Chemical Laser (SWCL) Workshop.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 85.

DEC 84 42P

PERSONAL AUTHORS: Watt,W. ;

REPORT NO. WJSA-R85T-03

CONTRACT NO. F49620-84-C-0104

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0277

UNCLASSIFIED REPORT

ABSTRACT: (U) The workshop was held for the purpose of identifying the government's interest in SWCL technology, reviewing past and present efforts in this area and presenting the government's plans for a new thrust in SWCL source development. In addition, the workshop was to provide a forum for interaction between members of the Strategic Defense Initiation Organization (SDIO) and the 8.1 agencies with the technical community in order to create an enthusiastic response to the SWCL thrust and to generate new concepts as well as to involve new participants in this technically challenging area. This document contains abstracts of papers presented at the workshops. Some of the topics discussed in the sessions include: HF Lasers - What have we learned?; Chemical Oxygen - Iodine Laser Review; Why So Few Chemical Lasers?; Approach to Efficient Short-Wavelength Chemical Lasers; Metal/Oxidizer Systems; Pyrotechnic Systems; Metastable State Production; Metastable Transfer Systems; Energy Exchange Mechanisms.

DESCRIPTORS: (U) *CHEMICAL LASERS, SHORT WAVELENGTHS, IODINE, ENERGY TRANSFER, HYDROGEN FLUORIDE LASERS, METASTABLE STATE, THRUST, OXYGEN, PLANNING, METALS, OXIDIZERS, PYROTECHNICS, WORKSHOPS

IDENTIFIERS: (U) PE61102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

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AD-A151 968

6/16

S-CUBED LA JOLLA CA

NEW HAMPSHIRE UNIV DURHAM VISION RESEARCH LAB

(U) Equation of State and Two-Body Correlations for Fluids of Non-Spherical Molecules.

(U) Spatial and Temporal Visual Masking and Visibility.

DESCRIPTIVE NOTE: Final rept. 1 Nov 82-31 Dec 84,

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-29 Sep 84.

JAN 85

40P

OCT 84

39P

PERSONAL AUTHORS: Walsman, E. M. ;

PERSONAL AUTHORS: Smith, R. A. ;

REPORT NO. SSS-R-85-7095

CONTRACT NO. AFOSR-80-0045

CONTRACT NO. F49620-83-C-0022, AFOSR-82-0018

PROJECT NO. 2313

TASK NO. A8

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0245

MONITOR: AFOSR
TR-85-0252

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Rutgers Univ., New Brunswick, N.J. Dept. of Mathematics.

ABSTRACT: (U) This report is concerned with the progress made in obtaining the equation of state for fluid mixtures of non-spherical molecules beyond which is already in the previous annual report, SSS-R-84-6456, December 1983. Mixing rules and the medianization procedure were used for a CO₂-C₂H₆ and other mixtures and found to give a very concise simple theory which is in good agreement with molecular dynamics. New mixing rules for spherical non-conformal potentials were obtained in the case of the exp-6. Originator supplied keywords include: Equation of State, Non-spherical Molecules, Non-conformal Potentials, Molecular Mixtures, Mixing Rules, Homonuclear Diatomics.

DESCRIPTORS: (U) *CORRELATION TECHNIQUES, *FLUID DYNAMICS, *EQUATIONS OF STATE, *MOLECULES, CARBON DIOXIDE, ETHANES, MOLECULAR PROPERTIES, MIXTURES, DIATOMIC MOLECULES, NUCLEAR PROPERTIES, THEORY

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8

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UNCLASSIFIED REPORT

ABSTRACT: (U) Two major studies have been completed this year, and several others are in progress. In visual masking, we have studied the effect of different detection criteria and find that criterion has a more profound effect than is usually believed. Not only does criterion change alter overall sensitivity, but the qualitative nature may yield either Weber's Law behavior or power-law behavior, depending on criterion. We conclude that much of the literature on spatial frequency masking is essentially unreplicable, since criterion was uncontrolled, and we offer possibility of using motion to enhance the visibility of displayed images. We have been studying hypothetical detectors for moving objects. We began this study with the simplest possible stimulus, a pair of briefly-flashed lines, separated in space and time (a variant of the apparent motion paradigm). Although lateral interactions between line segments have generally been reported to be inhibitory, with this paradigm, we find a range of excitatory interactions which suggest a motion detector with a tuned velocity of about 3 deg/sec. Additional keywords: Vision, Visibility, Charts.

DESCRIPTORS: (U) *VISUAL TARGETS, *VISUAL PERCEPTION, SENSITIVITY, REQUIREMENTS, LINEARITY, VELOCITY, TIME DEPENDENCE, MOTION, MOVING TARGETS, MASKING, SPATIAL DISTRIBUTION, VISION, DISPLAY SYSTEMS, VISIBILITY, DETECTION, BEHAVIOR

AD-A151 968

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A151 980 20/9 20/12

BOSTON COLL CHESTNUT HILL MA DEPT OF PHYSICS

(U) Effects of Magnetic Shear on Lower Hybrid Waves in the Supraauroral Region.

DESCRIPTIVE NOTE: Final rept. 1 Apr 83-31 Mar 84.

JAN 85 19P

PERSONAL AUTHORS: Bakshi, P. ;

CONTRACT NO. AFOSR-83-0112

PROJECT NO 2311

TASK NO. D9

MONITOR: AFOSR
TR-85-0251

UNCLASSIFIED REPORT

ABSTRACT: (U) Effects of magnetic shear on lower hybrid modes are investigated. It is shown that due to non-local effects, even a small shear can significantly affect the instability, leading to stabilization for some parameter ranges. These results are of importance in the context of the recently proposed mechanism of lower hybrid acceleration and ion evolution in the supraauroral region. Originator supplied keywords: Lower hybrid waves, Magnetic shear, Ion acceleration, Supraauroral plasma waves, Conics, Plasma instabilities.

DESCRIPTORS: (U) *MAGNETIC FIELDS, *SHEAR PROPERTIES, *PLASMAS(PHYSICS), ION ACCELERATORS, ACCELERATION, IONS, HYBRID SYSTEMS, PLASMA WAVES, STABILIZATION

IDENTIFIERS: (U) *Magnetic shear, *Lower hybrid waves, Supraauroral plasma waves, Instabilities, PE81102F, WUAFOSR231109

AD-A151 980

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AD-A151 977 12/1

WASHINGTON UNIV ST LOUIS MO DEPT OF PSYCHOLOGY

(U) A Comparison of Alternative Analytic Models for Event Related Potential Records.

DESCRIPTIVE NOTE: Final rept..

NOV 84 28P

PERSONAL AUTHORS: Hunt, E. ; Tianwattanata, P. ;

CONTRACT NO. AFOSR-83-0289

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0249

UNCLASSIFIED REPORT

ABSTRACT: (U) Principal Component Analysis is a technique that is widely used to extract component wave forms from event related potential (ERP) records. Analysis of simulated ERP records indicate that Principal Component Analysis may produce biased solutions in some cases. Two alternative methods of analysis are considered: confirmatory factor analysis and time series analysis. Confirmatory factor analysis provides superior results if the experimenter has reason to reject some component wave forms on a priori grounds. Time series analysis is preferable in situations in which the analysis can be conducted on only a few records. The ERP is a record of the electrical activity detected in the brain following the presentation of a stimulus.

DESCRIPTORS: (U) *BRAIN, *ELECTRICAL MEASUREMENT, MATHEMATICAL MODELS, WAVEFORMS, BIAS, SOLUTIONS(GENERAL), FACTOR ANALYSIS, TIME SERIES ANALYSIS, EXTRACTION

IDENTIFIERS: (U) *ERP(Event Related Potential), PE81102F, WUAFOSR2313A4

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SEARCH CONTROL NO. EVL05A

AD-A151 987 20/3

AD-A151 982 12/1 9/2

BRANDEIS UNIV WALTHAM MASS DEPT OF PHYSICS

CALIFORNIA INST OF TECH PASADENA DEPT OF APPLIED MATHEMATICS

(U) Theory of Sliding Charge Density Waves and Related Problems.

(U) Mathematical Software for Hyperbolic Equations and Two Point Boundary Value Problems.

DESCRIPTIVE NOTE: Annual technical rept. no. 1, 1 Nov 83-30 Oct 84.

DESCRIPTIVE NOTE: Final rept. 30 Sep 82-29 Feb 84.

NOV 84 10P

FEB 85 5P

PERSONAL AUTHORS: Sneddon, L. ;

PERSONAL AUTHORS: Keller, H. B. ; Kreiss, H. O. ;

CONTRACT NO. AFOSR-84-0014

CONTRACT NO. AFOSR-82-0321

PROJECT NO. 2301

PROJECT NO. 2304

TASK NO. A8

TASK NO. A3

MONITOR: AFOSR TR-85-0255

MONITOR: AFOSR TR-85-0272

UNCLASSIFIED REPORT

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ABSTRACT: (U) The dc dynamics of models of incommensurate charge density wave (CDW) conductivity was reduced to a purely static problem. The dc characteristics of the incommensurate chain have been determined. A microscopic understanding of differences in nonlinear electrical properties of different CDW materials has been obtained. The experimentally observed scaling of field- and frequency-dependent conductivities was shown to occur in classical systems and can therefore no longer be regarded as evidence of quantum tunneling. The dynamic threshold of incommensurate charge density wave conductivity was seen to be described by a new characteristic function, in which singularities emerge as the velocity approaches zero. The dynamics of the incommensurate chain with long range interactions has been solved exactly, using both analytic and graphical techniques. This complete solution provides direct insight into nonlinear sliding conductivity. (Author).

DESCRIPTORS: (U) *CHARGE DENSITY, *WAVES, ELECTRICAL CONDUCTIVITY, DIRECT CURRENT, ELECTRICAL PROPERTIES

IDENTIFIERS: (U) *Sliding charge density waves, WUAFOSR2301A8, PE61102F

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AD-A151 982

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ABSTRACT: (U) This document reports that the original software development program has been extended in several directions: adaptive mesh generation, multigrid methods, singular perturbation problems. A crude code generator for very general two point boundary value problems has been activated. Extensions in all these directions are under way. (Author)

DESCRIPTORS: (U) *HYPERBOLAS, *MATHEMATICAL PROGRAMMING, *COMPUTER PROGRAMS, *BOUNDARY VALUE PROBLEMS, MESH, PERTURBATIONS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A151 990 11/8 7/4

MCDONNELL DOUGLAS RESEARCH LABS ST LOUIS MO

(U) Metallurgical Characterization of Aluminum Powder Consolidation.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 83-1 Sep 84.

SEP 84 45P

PERSONAL AUTHORS: Sastry, S. M. L. ; Peng, T. C. ; Bowden, D. M. ; O'Neal, J. E. ;

CONTRACT NO. F49620-83-C-0152

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-85-0254

UNCLASSIFIED REPORT

ABSTRACT: (U) The influence of metallurgical and process variables on the consolidation, densification, and properties of rapidly solidified aluminum alloy powders is being investigated. Cold compaction, hot pressing, powder extrusion, and explosive consolidation are being used to consolidate rapidly solidified 9.9% aluminum powder (reference material), Al-3Li-1Cu-1Mg-0.2Zr (a representative low-density, high-modulus alloy), and Al-8Fe-7Ce alloys (representative of high-temperature alloys). The alloys included in the study provide wide variations in hardness, flow stress, work hardening rate, plasticity, and oxide-film thickness. The consolidation techniques selected for the study provide variations in pressure, compaction rate, and extent of oxide-film breakdown. Three 35-kg lots of rapidly solidified alloy powders were prepared by vacuum atomization; and the powders were characterized with respect to particle size distribution, cooling rates, constituent phases, and volatile contaminants. The pressure dependence of densification during cold compaction was correlated with the yield stress and work hardening of the three alloys. Originator-supplied keywords include: Aluminum alloys, Hot pressing, Densification, Microstructure, Zirconium, Powder metallurgy, Extrusion, Interparticle bonding, Porosity, Degassing, Rapid solidification, Explosive

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AD-A151 999 21/2 20/4 12/1 21/8.2 AD-A151 999 CONTINUED

PRINCETON COMBUSTION RESEARCH LABS INC NJ

(U) Analysis of Combustion Oscillations in Heterogeneous Systems.

DESCRIPTIVE NOTE: Final rept. 15 Mar 82-15 Mar 84,

MAY 84 97P

PERSONAL AUTHORS: Ben-Reuven, M. ;

REPORT NO. PCRL-FR-84-002

CONTRACT NO. F49620-82-C-0062

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0250

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) This study is aimed at elucidation of the physical mechanisms capable of driving acoustic instability in solid propellant rocket motors, of the type termed velocity-coupled instability. The first and second tasks of this research. Critical Literature Review, and Order of Magnitude Analyses of velocity-coupling mechanisms, have been reported earlier. The third part of the study. Analytical Simulation of the Interior Flowfield Within a Solid Propellant Grain, is reported herein. The subject of the present analysis is simulation of the cold-flow experiments by Dr. Brown at UTC/CSD, in which nitrogen is injected through the porous sidewalls of a cylindrical pipe, creating an internal axisymmetric flow field. A comprehensive analytical model of the nonsteady flow processes entails a system of four partial differential equations for continuity, radial and axial momentum and thermal enthalpy. The flowfield is considered compressible and viscous, with all of the dissipative terms included. A focal point of the analysis has been the thin viscous sublayer adjacent to the porous surface, where visco-acoustic interactions occur. Additional keywords: mathematical models; combustion stability; numerical analysis; computations; heat

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transfer; and perturbations.

DESCRIPTORS: (U) *COMBUSTION STABILITY, COMBUSTION, SOLID PROPELLANT ROCKET ENGINES, ROCKET PROPELLANT GRAINS, PERTURBATIONS, VELOCITY, COUPLING(INTERACTION), SOLID ROCKET PROPELLANTS, RADIAL FLOW, VISCOUS FLOW, ACOUSTICS, PARTIAL DIFFERENTIAL EQUATIONS, HETEROGENEITY, OSCILLATION, MATHEMATICAL MODELS, LITERATURE SURVEYS, DISSIPATION, HEAT TRANSFER, AXIALLY SYMMETRIC FLOW, FLOW FIELDS, INTERNAL, NITROGEN, PHYSICAL PROPERTIES, MOMENTUM, ENTHALPY, THERMAL PROPERTIES, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, POROUS MATERIALS, SURFACES, THINNESS

IDENTIFIERS: (U) Acoustic instability, Velocity coupled instability, Visco-acoustic interactions, Nonsteady flow, PE61102F, WJAFOSR2308A1

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AD-A152 000 12/1 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA
AD-A152 000 CONTINUED

CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING
(U) Adaptive Control for Uncertain Dynamical Systems.

84 70P

PERSONAL AUTHORS: Corless, M. ; Leitmann, G. ;

CONTRACT NO. AFOSR-ISSA-84-00068, NSF-ECS78-13931

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0274

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Dynamical Systems and
Microphysics, Control Theory and Mechanics, p91-158 1984.

ABSTRACT: (U) In this paper, a mathematical model is embodied in ordinary differential equations, the state equations of the system. We divide the systems under consideration into three subclasses depending on the type of potentially destabilizing uncertainties present in the system description (model uncertainty) and in the way the control enters into the description (input uncertainty). For each of the systems considered there exists a state feedback control which assures that the zero state is globally uniformly asymptotically stable. However, these controls depend on constants in the system description which are not known; e.g., such constants are the values of unknown constant disturbances or unknown bounds on time-varying parameters or inputs. We propose controllers which may be regarded as adaptive versions of the feedback controls mentioned above; in place of the unknown constants, one employs quantities which change or adapt as the state of the system evolves. Under some circumstances, these adaptive quantities may be considered to be estimates of the unknown constants. The method of devising these adaptive controllers is based on the constructive use of Lyapunov theory as suggested, in a somewhat different context, in previous works.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *FEEDBACK, *MATHEMATICAL MODELS, ESTIMATES, STABILITY, PERTURBATIONS, EVOLUTION(GENERAL), REPRINTS, CONTROL, CONSTANTS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A152 001 CONTINUED

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF PHYSICS

(U) Studies of Collisional and Nonlinear Radiative Process
for Development of Coherent UV and XUV Sources.

IDENTIFIERS: (U) PEG102F, WUAFOSR2301A1

DESCRIPTIVE NOTE: Final rept. Nov 83-Nov 84,

NOV 84 116P

PERSONAL AUTHORS: Rhodes, C. K. ; Pummer, H. ; Egger, H. ;

CONTRACT NO. AFOSR-82-0280

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0253

UNCLASSIFIED REPORT

ABSTRACT: (U) The availability of recently developed high brightness picosecond rare gas halogen sources permits the performance of a broad range of basic physical studies of high-lying electronic states of atomic and molecular materials. Moreover, the extension of the ultraviolet source technology to the femtosecond range will enable the generation of extreme physical environments, namely, coherent irradiation with an electric field amplitude, that are impossible to establish by any other known means. Experiments conducted over the past year indicate that it may be feasible to examine the detailed properties of states in a wide variety of systems in the region above 100 eV, and even possibly into the 1000 range of excitation, with these new experimental tools. The excited configurations of principal interest are those coupled to adjacent continua, prominent members of which are multiply excited and core excited states. The nature of intra-atomic interactions, including collective motions, figures naturally and importantly in this topic.

DESCRIPTORS: (U) *ELECTRONIC STATES, COHERENT RADIATION, ATOMS, INTERACTIONS, COLLISIONS, FAR ULTRAVIOLET RADIATION, EXCITATION, BRIGHTNESS, ULTRAVIOLET RADIATION, AMPLITUDE, ELECTRIC FIELDS, MATERIALS, MOLECULES, HALOGENS

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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TEXAS UNIV AT ARLINGTON

(U) Detonations of Solid Explosives.

DESCRIPTIVE NOTE: Final rept. 1 Nov 82-31 Oct 84,

DEC 84 44P

PERSONAL AUTHORS: Brener, N. E. ;

CONTRACT NO. AFOSR-83-0024

PROJECT NO. 2301

TASK NO. A6

MONITOR: AFOSR
TR-85-0261

UNCLASSIFIED REPORT

ABSTRACT: (U) The main goal of this project, is to calculate the activation energy of explosive molecules. Progress has come in the form of four different approaches to the problem: (1) Configuration interaction method; (2) Gaussian 82 Computer program; (3) MNDOQC procedure; (4) Green's function techniques. We will have the first Cray version of Dr. Henry F. Schaefer's CI programs, and access to several large Cray computers on which to run the programs. As a result, we expect to perform very large and highly accurate CI calculations on explosive molecules of interest. The Gaussian 82 Computer program is generally considered to be state of the art in the area of Moller-Plesset perturbation theory. We have recently obtained access to a new Cray version of Gaussian 82 which is not yet available to the general scientific community and we expect to perform activation energy calculations that are better and more accurate values than those that were previously possible using Gaussian 82. The MNDOQC method, which is a new correlated version of the MNDO method, has been used to compute accurate values for the activation energy of methyl nitrate. We have recently used Green's function theory to derive a new one-electron equation that goes beyond previous one-electron equations to include higher order correlation terms. As correlation plays a very important part in molecular reactions, this new equation is expected to lead to significant improvements in the calculation of molecular activation energies.

DESCRIPTORS: (U) *ACTIVATION ENERGY, *EXPLOSIVES, *DETONATIONS, *REACTION KINETICS, COMPUTER PROGRAMS, PERTURBATION THEORY, ELECTRONS, NITRATES, COMPUTATIONS, CONFIGURATIONS, INTERACTIONS, GREENS FUNCTION, SOLID PHASES, CORRELATION, MOLECULAR PROPERTIES

IDENTIFIERS: (U) CRAY computers, MNDO methods, Moller Plesset perturbation theory, *Methy nitrate, One electron equations, *Solid explosives, CI(Configuration Interaction), PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A151 886

12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Asymptotic Joint Distribution of the Eigenvalues of the Noncentral Manova Matrix for Nonnormal Populations.

DESCRIPTIVE NOTE: Technical rept..

DEC 84

18P

PERSONAL AUTHORS: Bai, Z. D.; Krishniah, P. R.; Liang, W. Q.

REPORT NO. TR-84-53

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0263

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of testing the hypothesis of the inequality of the mean vectors of several multivariate populations with a common covariance matrix received considerable attention in the literature. The test procedures are based upon certain functions of the eigenvalues of the multivariate analysis of variance (MANOVA) matrix. In the univariate case, the MANOVA matrix reduces to the ratio of the between group and within group sums of squares. The joint distribution of the eigenvalues of the MANOVA matrix in the noncentral case is useful in studying the power of the tests for the inequality of the mean vectors. This distribution is also useful in the problems connected with selection of important discriminant functions in the area of classification. Fisher, Hsu, and Roy have independently derived the joint distribution of the eigenvalues of the MANOVA matrix in the central case. Hsu derived the above distribution in the noncentral case when the sample size tends to infinity and the underlying distribution is multivariate normal. In proving the above result, Hsu assumed that the ratios of the sample sizes in the groups to the total sample size tend to constants in the limiting case. This paper extends the result of Hsu to the case when the underlying distribution is not

AD-A151 886

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necessarily multivariate normal. Additional keywords include: Nonnormal populations.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *MATRICES(MATHEMATICS), *POPULATION(MATHEMATICS), INEQUALITIES, VECTOR ANALYSIS, TEST METHODS, ASYMPTOTIC SERIES, EIGENVALUES, HYPOTHESES, ANALYSIS OF VARIANCE

IDENTIFIERS: (U) Nonnormal populations, PE81102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A151 885

12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Limiting Empirical Distribution Function of the Eigenvalues of a Multivariate F Matrix. Revised.

DESCRIPTIVE NOTE: Technical rept.,

DEC 84 22P

PERSONAL AUTHORS: Bai, Z. D.; Yin, Y. Q.; Krishnaiah, P. R.;

REPORT NO. TR-84-42-REV

CONTRACT NO. F49620-82-K-0001, F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0262

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated Oct 84, AD-A149 818.

ABSTRACT: (U) In this paper, the authors derived an explicit expression for the limit of the empirical distribution function (e.d.f.) of a central multivariate F matrix when the number of variables and degrees of freedom both tend to infinity in certain fashion. The authors also extended the above result to the case when the underlying distribution is not necessarily multivariate normal but the first four moments exist. The limiting distribution is useful in deriving the limiting distributions of certain test statistics which arise in multivariate analysis of variance, canonical correlation analysis and tests for the equality of two covariance matrices. Additional keywords: Wishart matrices; computations; correlation. (Author).

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, *MULTIVARIATE ANALYSIS, *MATRICES(MATHEMATICS), CORRELATION, DEGREES OF FREEDOM, ANALYSIS OF VARIANCE, STATISTICAL TESTS, WISHART MATRICES, COMPUTATIONS, EIGENVALUES, LIMITATIONS, VARIABLES, COVARIANCE

IDENTIFIERS: (U) F Matrix, PEB1102F, WUAFOSR2304A5

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NEW MEXICO UNIV ALBUQUERQUE BUREAU OF ENGINEERING RESEARCH

(U) Elastic-Workhardening SDF (Single-Degree-of-Freedom) System Subjected to Random Blast Excitations.

DESCRIPTIVE NOTE: Interim rept.,

NOV 84 52P

PERSONAL AUTHORS: Ju, F. D.; Paez, T. L.; Chang, F.;

REPORT NO. ME-130(84)AFOSR-993-1

CONTRACT NO. AFOSR-81-0086

PROJECT NO. 2307

TASK NO. C2

MONITOR: AFOSR
TR-85-0269

UNCLASSIFIED REPORT

ABSTRACT: (U) An above ground explosion generates a shock wave in air, or airblast, and is accompanied by some duration of strong wind. Especially, the airblast from a nuclear detonation can cause extremely high air pressures and has a relatively long period of duration. When structures under design may be subjected to this sort of loading condition, it is necessary to analyze the behaviors of the structures when subjected to this kind of input to determine whether the structures can survive or not. The present phase of investigation developed a model to characterize the permanent set of SDF, bilinear hysteretic system subject to blast type loading. From that model, the elastic structural response was characterized. A computer program VAR.F was developed to compute the moments of critical measures of inelastic response. The means and variances the maximum displacement response of the permanent set and of the energy of dissipation are all useful in probabilistic analyses in structural design or in damage assessment of structures subjected to blast-type loadings. Originator-supplied keywords include: Bilinear work-hardening, Permanent set, Maximum displacement response, Energy of dissipation, Computer program, Fortran.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A151 866 CONTINUED

AD-A151 799 20/11

DESCRIPTORS: (U) *BLAST LOADS, *STRUCTURAL RESPONSE, OVERPRESSURE, LONG RANGE(TIME), AIRBURST, EXCITATION, SURVIVABILITY, PROBABILITY, HARDENED STRUCTURES, DEGREES OF FREEDOM, AIRBORNE, HYSTERESIS, COMPUTER PROGRAMS, DISPLACEMENT, RESPONSE, DISSIPATION, ENERGY, FORTRAN, DAMAGE ASSESSMENT, ELASTIC PROPERTIES, HIGH PRESSURE, RIGIDITY, MOMENTS, NUCLEAR EXPLOSIONS, SHOCK WAVES

PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS

(U) Initiation, Growth, and Coalescence of Small Fatigue Cracks.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 83-14 Jan 84,

IDENTIFIERS: (U) Airblast, Work hardening, Bilinear work hardening, Maximum displacement response, PE61102F, WUAFOSR2307C2

MAY 84 83P

PERSONAL AUTHORS: Grandt, A. F., Jr.

CONTRACT NO. AFOSR-82-0041

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR
TR-85-0064

UNCLASSIFIED REPORT

ABSTRACT: (U) This interim report summarizes the second year's progress on a research effort directed at studying the initiation, growth, and coalescence of small fatigue cracks at notches. A fracture mechanics based model is described to predict the growth and coalescence of multiple cracks located at notches. The predictive model is compared with experimental results obtained with multiple cracked specimens made from a transparent polymer and for metal specimens. Current efforts and future goals are also briefly described. (Author)

DESCRIPTORS: (U) *CRACKS, *FATIGUE(MECHANICS), COALESCENCE, CRACK PROPAGATION, CRACKING(FRACTURING), NOTCH SENSITIVITY, MATHEMATICAL MODELS

IDENTIFIERS: (U) PE61102F, WUAFOSR2307B2

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AD-A151 744 CONTINUED

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

DESCRIPTORS: (U) *ION BOMBARDMENT, *SURFACE ANALYSIS, *MASS SPECTROMETRY, CLUSTERING, DESORPTION, ATOMS, RHODIUM, DISTRIBUTION, IONIZATION, PHOTONS, RESONANCE, NEUTRAL, PARTICLES, ENERGY, POLYCRYSTALLINE, SINGLE CRYSTALS, SURFACES

(U) Secondary Ion Mass Spectrometry Studies of Solids and Surfaces.

DESCRIPTIVE NOTE: Final rept. 1 Nov 83-31 Oct 84.

IDENTIFIERS: (U) Secondary ion mass spectrometry, Angular distribution, PE61102F, WUAFOSR2303A2

JAN 85 15P

PERSONAL AUTHORS: Winograd, N. ;

CONTRACT NO. AFOSR-82-0057

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0228

UNCLASSIFIED REPORT

ABSTRACT: (U) We have recently completed construction of an energy- and angle-resolved detector for neutral particles desorbed from ion bombarded surfaces. It is based on a time-of-flight measurement for the neutral energies, multiphoton resonance ionization (MPRI) for the angular information. Using this detector, we have initiated a series of experiments aimed at determining the energy and angular distributions of the Rh atoms ejected from clean and adsorbate covered polycrystalline and single crystal surfaces. From the polycrystalline material, we find the velocity distribution of Rh atoms follows closely the form predicted by Thompson with a peak intensity occurring at approximately 5 eV and a high energy tail decreasing in intensity as E^{-2} . Polar angle distributions exhibit nearly a \cos^2 shape. From a Rh(001) crystal, the velocity distribution generally peaks at higher value than that found from the polycrystalline surface, and depends strongly on the value of the polar collection angle. In addition to energy distribution measurements into a given angle, we are able to extract angular distribution measurements into a given azimuth from Rh(001) show three peaks of preferred ejection angles. Originator supplied keywords include: Surface Analysis, Secondary Ion Mass Spectrometry, Ion Bombardment, Multi-Photon, Clusters.

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AD-A151 740 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Transformations in Regression: A Robust Analysis.

FEB 85 13P

PERSONAL AUTHORS: Carroll, R. J. ; Ruppert, D. ;

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0268

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Technometrics, v27 n1 p1-12
Feb 85.

ABSTRACT: (U) The authors consider two approaches to robust estimation for the Box-Cox power-transformation model. One approach maximizes weighted, modified likelihoods. A second approach bounds a measure of gross-error sensitivity. Among the authors' primary concerns is the performance of these estimators on actual data. In examples that the authors study, there seem to be only minor differences between these two robust estimators, but they behave rather differently than the maximum likelihood estimator of estimators that bound only the influence of the residuals. These examples show that model selection, determination of the transformation parameter, and outlier identification are fundamentally interconnected. Keywords include: Power transformation; Box-Cox model; robust estimation; influence functions.

DESCRIPTORS: (U) *TRANSFORMATIONS(MATHEMATICS), *ESTIMATES, REGRESSION ANALYSIS, MATHEMATICAL MODELS, FUNCTIONS(MATHEMATICS), MATHEMATICAL MODELS, REPRINTS, SELECTION, RESIDUALS, POWER

IDENTIFIERS: (U) Robust estimation, Power transformation, Estimators, Influence functions, Box cox power transformation model, PE81102F, WUAFOSR2304A5

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AD-A151 612 9/1

CARNEGIE-MELLON INST OF RESEARCH PITTSBURGH PA

(U) Structured Phase Transitions on a Finite Interval,
84 38P

PERSONAL AUTHORS: Carr, J. ; Gurtin, M. E. ; Slemrod, M. ;

CONTRACT NO. DAAG29-82-K-0002, AFOSR-81-0172

MONITOR: ARO, AFOSR
18483.7-MA, TR-85-0273

UNCLASSIFIED REPORT

Availability: Pub. in Archive for Rational Mechanics and Analysis, v86 n4 p317-351 1984 (No copies furnished by DTIC/NTIS).

SUPPLEMENTARY NOTE: Supported in part by DAAG29-80-C-0041

ABSTRACT: (U) VAN DER WAALS, in his classic paper, gave arguments in support of a compressible fluid whose free energy at constant temperature depends not only on the density, but also on the density gradient. CAHN & HILLIARD, apparently unaware of VAN DER WAALS' paper, rederived VAN DER WAALS' theory and, using this theory, obtained several important results concerning the interfacial energy between phases. Since then gradient theories have been used to analyze phase transitions, spinodal decomposition, and other physical phenomena.

DESCRIPTORS: (U) *PHASE TRANSFORMATIONS, THEORY, REPRINTS, COMPRESSIVE PROPERTIES, DENSITY, PHYSICAL PROPERTIES, FREE ENERGY, INTERFACES, PHASE TRANSFORMATIONS, SPINODAL DECOMPOSITION

IDENTIFIERS: (U) Finite interval

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AD-A151 539 20/6

TEXAS UNIV AT AUSTIN

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ELECTRICAL ENGINEERING

(U) Mathematical Models Relating to Human Thermoregulation:
Basic Assumptions, Validation, and Application. Parts
A & B.

(U) Nonlinear Edge Preserving Filtering Techniques for
Image Enhancement.

DESCRIPTIVE NOTE: Final rept. 2 Mar 82-28 Feb 83.

DESCRIPTIVE NOTE: Technical rept.,

NOV 84 190P

JUN 84 5P

PERSONAL AUTHORS: Wissler, E. H. ;

PERSONAL AUTHORS: Lee, Y. H. ; Kassam, S. A. ;

CONTRACT NO. AFOSR-MIPR-82-0214

CONTRACT NO. AFOSR-82-0022

PROJECT NO. 2312

PROJECT NO. 2304

TASK NO. A1

TASK NO. A5

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0181

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at a workshop held at Texas
Univ., Austin on 13-15 Dec 82.

SUPPLEMENTARY NOTE: Presented at the Midwest Symposium on
Circuits and Systems (27th) Held in Jun 84.

ABSTRACT: (U) A workshop was held at The University of Texas at Austin in December 1982. The workshop evaluated available mathematical models which could be used to simulate human thermal behavior under various conditions. The program involved the following four activities: (1) obtain copies of the mathematical models, install them on computers located at the University of Texas, and verify that they were operating correctly, (2) collect sets of data suitable for testing mathematical models and enter them into a machine readable data base, (3) use the models to simulate the conditions represented by the experimental data, (4) discuss the simulated results with the authors of the models and a group of outstanding thermal physiologists who offer constructive criticism and suggestions for improving the models. (Author)

ABSTRACT: (U) Recently introduced generalizations of the median filter (namely the alpha-trimmed mean and modified trimmed mean filters) are reviewed and related to a class of nonlinear filters called selective averaging filters, and two new filters are defined. These filters are examined for performance on noise-corrupted images and shown to have good smoothing characteristics without edge smearing.

DESCRIPTORS: (U) *THERMAL PROPERTIES, *MATHEMATICAL MODELS, *HUMAN BODY, DATA BASES, BODY TEMPERATURE, HEAT BALANCE, HUMANS, PHYSIOLOGISTS, BEHAVIOR, WORKSHOPS, DATA PROCESSING, EXPERIMENTAL DATA, COMPUTER APPLICATIONS

DESCRIPTORS: (U) *OPTICAL IMAGES, *IMAGE PROCESSING, FILTER ANALYSIS, FILTERS, NONLINEAR SYSTEMS, OPTIMIZATION, EDGES

IDENTIFIERS: (U) WUAFOSR2312A1, PE61102F

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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SEARCH CONTROL NO. EVLOSA

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7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Dimethylsilylene: Its Optical Absorption Spectrum and Reaction Kinetics.

84

4P

PERSONAL AUTHORS: Nazran, A. S.; Havar, J. A.; Griller, D. ; Ainaimi, I. S.; Weber, W. P. ;

CONTRACT NO. AFOSR-80-0006

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0217

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v108 p7267-7277 1984.

ABSTRACT: (U) Photolysis of dodecamethylcyclohexasilane has been used as a convenient source of dimethylsilylene in solution and in the gas phase. The reaction has also been used to generate the silylene in hydrocarbon and argon matrices so that its infrared, UV-visible, and fluorescence spectra could be recorded. In fact, irradiation in the UV-visible band at 450 nm has been used to induce rearrangements of dimethylsilylene which have been monitored by infrared spectroscopy. We report results which show that this system is more complicated than the current literature suggests and which demonstrates that the UV-visible spectrum of dimethylsilylene has been incorrectly assigned or that there is a substantial shift in its absorption maximum in going from matrices to solution. Authors keywords include: dimethylsilylene; quenching; kinetics; UV spectroscopy.

DESCRIPTORS: (U) *SILICON COMPOUNDS, *METHYL RADICALS, *REACTION KINETICS, *ABSORPTION SPECTRA, SILANES, REPRINTS, FLUORESCENCE, INFRARED SPECTROSCOPY, PHOTOLYSIS, VISIBLE SPECTRA, QUENCHING, ULTRAVIOLET SPECTROSCOPY

IDENTIFIERS: (U) Dimethylsilylene, WUAFOSR2303B2, PES1102F

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UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Photolysis of Dodecamethylcyclohexasilane: Formation of Both Methylsilylene and Dimethylsilylene.

84

4P

PERSONAL AUTHORS: Ainaimi, I. S.; Weber, W. P.; Nazran, A. S.; Griller, D. ;

CONTRACT NO. AFOSR-80-0006

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0223

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v272 pC10-C12 1984.

ABSTRACT: (U) Experimental and spectroscopic investigations of the products of dodecamethylcyclohexasilane photolysis on reaction with labeled organic reagents throw new light on the formation of methylsilylene and dimethylsilylene and their interconversion reactions. Photolysis of dodecamethylcyclohexasilane (I) with light of 254 nm has been reported to yield decamethylcyclopentasilane and dimethylsilylene (II). This procedure is in fact the standard method to generate II in solution. We would like to report experimental and spectroscopic observations which demonstrate that this system is more complicated than the current literature suggest. Specifically, that photolysis of I in the presence of ethanol-0-d sub 1 leads to both II and methylsilylene (III). Dimethylsilylene (II) reacts with ethanol-0-d sub 1 to yield dimethylethoxysilane-Si-d 1 (IV-Si-d sub 1) while III reacts with ethanol-0-d sub 1 to yield dimethylethoxysilane-C-d sub 1 (IV-C-d sub 1). Author keywords include: dimethylsilylene; methylsilylene; reaction with ethanol 0-d sub 1; photolysis dodecamethyl cyclohexasilane.

DESCRIPTORS: (U) *SILANES, *METHYL RADICALS, *PHOTOLYSIS, ETHANOLS, EXPERIMENTAL DATA, REPRINTS, SPECTROSCOPY

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ROCKWELL INTERNATIONAL ANAHEIM CA SCIENCE CENTER

IDENTIFIERS: (U) Dimethylsilene, Dimethylsilylene,
Silane/Dodecamethyl cyclohexa, WUAFOSR2303B2, PE61102F

(U) The Role of Oxygen in the Redox Chemistry of Lutetium
Diphthalocyanine.

OCT 84 4P

PERSONAL AUTHORS: Nicholson, M. M. ; Weismuller, T. P. ;

CONTRACT NO. F49620-83-C-0088

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0213

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Electrochemical
Society, v131 n10 p2311-2313 Oct 84.

ABSTRACT: (U) Spectroscopic evidence on the role of
oxygen in the redox chemistry of lutetium
diphthalocyanine is reported. The observations indicate
an irreversible reaction of oxygen with vacuum-sublimed
films of the dye material and a reversible reaction with
its solution in dimethylformamide. This behavior can
account for several apparent anomalies found in previous
investigations. Author keywords include: Phthalocyanines;
oxygen; spectroscopy; electrochemistry.

DESCRIPTORS: (U) *OXYGEN, *OXIDATION REDUCTION REACTIONS,
*SPECTROSCOPY, *LUTETIUM COMPOUNDS, *PHthalOCYANINES,
REPRINTS, DYES, FORMAMIDES, METHYL RADICALS,
ELECTROCHEMISTRY

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) The Ballooning Spectrum of Rotating Plasmas.

FEB 84 11P

(U) Microwave Emission from Relativistic Electron Beams.

PERSONAL AUTHORS: Hamel, E.; Laurence, P.;

DESCRIPTIVE NOTE: Interim scientific rept. 1 Nov 83-31 Oct 84.

CONTRACT NO. AFOSR-81-0020

NOV 84 40P

PROJECT NO. 2304

PERSONAL AUTHORS: Bekefi, G.;

TASK NO. A4

CONTRACT NO. AFOSR-84-0028

MONITOR: AFOSR
TR-85-0184

PROJECT NO. 2301

TASK NO. A1

SUPPLEMENTARY NOTE: Pub. in Jnl. of Mathematical Physics,
v25 n2 p396-405 Feb 84.MONITOR: AFOSR
TR-85-0238

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Ballooning modes are shown to be part of the spectrum by using a 'singular sequence' of localized modes. We show that the modes arise from Alfvén and slow magnetosonic waves propagating along rays confined inside the plasma. Different ballooning modes are seen, depending on the particular rotating frame of observation, indicating that there are accumulation points of eigenvalues. The effect of rigidly rotating flow is seen to be destabilizing due to an analog of the Rayleigh-Taylor instability associated with density gradients in the presence of a centrifugal force. Flow shear also modifies the stability criterion. A certain component of the flow shear will eliminate the ballooning modes. (Author)

DESCRIPTORS: (U) *PLASMA OSCILLATIONS, EIGENVALUES, ROTATION, CENTRIFUGAL FORCE, FLOW, SHEAR PROPERTIES, STABILITY

IDENTIFIERS: (U) Rayleigh-Taylor instability.
WUAFOSR2304A4, PE81102F

ABSTRACT: (U) A free electron laser equipment is currently underway in which a 1kA, 2.1MeV electron beam is excited by a helical wiggler field of 2 cm periodicity to produce submillimeter radiation at wavelengths between 400 and 600 micrometers. This experiment will operate in the high gain Raman regime with a maximum calculated output power at saturation of approximately 50MW. This free electron is unique in two respects. First, the electron beam will be transported through the wiggler with the aid of two short solenoidal focussing lenses. This system obviates the need for strong uniform guiding magnetic field in the interaction region thereby insuring that the cyclotron maser quality is not excited. Second, this FEL employs a very high quality electron beam. The beam is produced in a multielectrode electron gun which uses a cold field emission cathode. The gun consists of a planar cathode and anode grid followed by four accelerating stages. The accelerating electrodes are shaped to provide electrostatic focussing by balancing the self-electric and magnetic fields of the beam.

DESCRIPTORS: (U) *ELECTRON EMISSION, *MICROWAVE BEAMS, *MILLIMETER WAVES, *FREE ELECTRON LASERS, ELECTRON BEAMS, MAGNETRONS, MAGNETIC FIELDS, ELECTRIC FIELDS, ELECTROMAGNETIC RADIATION

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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AD-A151 447 7/5 20/8

IDENTIFIERS: (U) *Microwave emission, *Millimeter wave
emission, Rippled field magnetron, Emission guns,
PE61102F, WUAFOSR2301A1

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Laser-Induced Molecular Dynamics: Rate Processes in
the Gas Phase and at Solid Surfaces.

JAN 85 152P

PERSONAL AUTHORS: Lin, J. T. ; Hutchinson, M. ; George, T. F. ;

CONTRACT NO. AFOSR-82-0046

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0225

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advances in Multi-Photon
Processes and Spectroscopy, v1 p105-237 1984.

ABSTRACT: (U) Various theoretical approaches to laser-
induced molecular dynamics in the context of multiphoton
processes are reviewed. The presentation is divided into
two general categories: gas-phase processes and surface
processes. Within the first category, unimolecular
dynamics and molecular collisions are addressed. Within
the second category, energy flow in adspecies-surface
systems is examined, and laser applications to the
surface chemistry are discussed. Originator-Supplied
keywords include: Unimolecular Dynamics, Molecular
Collisions, Transition-State Spectroscopy.

DESCRIPTORS: (U) *LASER APPLICATIONS, *PHOTOCHEMICAL
REACTIONS, *MOLECULAR STATES, REACTION KINETICS, VAPOR
PHASES, SURFACE CHEMISTRY, ENERGY TRANSFER, COLLISIONS,
SPECTROSCOPY

IDENTIFIERS: (U) Molecular dynamics, PE61102F,
WUAFOSR2303A2

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ROCKWELL INTERNATIONAL ANAHEIM CA MICROELECTRONICS
RESEARCH AND DEVELOPMENT CENTER

(U) Epitaxial Garnets and Hexagonal Ferrites.

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 82-14 Jun
83.

DEC 83 31P

PERSONAL AUTHORS: Glass, H. L.; Adkins, L. R.;

REPORT NO. C83-636/501.1

CONTRACT NO. F49620-82-C-0081

MONITOR: AFOSR
TR-85-0118

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Continuation of Contracts F4620-75-C-
0045, F49620-79-C-0048, and F49620-80-C-0045.

ABSTRACT: (U) The objective of this research is to develop new and improved epitaxial ferrite materials for use in microwave and millimeter-wave signal processing devices. The major emphasis has been on multiple layer magnetic garnet structures for magnetostatic wave (MSW) delay lines. Previous research demonstrated that improved linearly dispersive MSW characteristics (that is, linear variation of delay time with frequency) could be obtained using structures which consisted of two epitaxial magnetic garnet layers separated by an epitaxial nonmagnetic layer. More detailed analysis of the magnetostatic modes in such multiple layer materials was carried out using ferromagnetic resonance (FMR) spectroscopy. This work is aimed at understanding details such as the occurrence of notches in the passband of multiple layer MSW delay lines. A significant problem, common to all MSW delay lines--single layer as well as multiple layer, is the presence of fluctuations in the delay vs. frequency characteristics. These fluctuations, usually called ripple, are attributed reflections of the propagating magnetostatic waves. A new method for suppressing ripple has been devised and demonstrated. In the course of studying epitaxial growth of strontium hexaferrites, a new ferrite material was developed. Crystal growth of gallate spinels for use as substrates

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CONTROL DATA CORP MINNEAPOLIS MN

(U) A Brief Climatology of Vertical Wind Variability in the Troposphere and Stratosphere as Seen by the Poker Flat, Alaska, MST Radar.

MAR 84 9P

PERSONAL AUTHORS: Nastrom, G. D.; Gage, K. S.;

CONTRACT NO. F49620-82-C-0029

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-85-0211

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Climate and Applied Meteorology, v23 n3 p453-460 Mar 84.

ABSTRACT: (U) A statistical analysis of vertical air motion has been performed for data taken in the 3-20 km altitude range by the Poker Flat MST(Mesosphere - Stratosphere - Troposphere) radar during the period September 1979-January 1982. The variability of vertical velocities is analyzed as a function of season, time of day and synoptic weather conditions. The overall frequency distribution of vertical velocities can be approximated by the sum of two normal distributions: one with variance about 10 times larger than the other. The variability of vertical velocity at all levels is found to correlate most closely with horizontal wind speed at 700 mb on a day-to-day basis. The total variance is larger in summer than in winter at all hours of the day and especially during the afternoon hours. A statistically significant diurnal variation of vertical motions is found during summer with amplitude in the midtroposphere near 2 cm/s. Interpreting the vertical wind variability as a manifestation of vertically propagating waves, we compare the results here with earlier studies of turbulence variations. These comparisons show a plausible link between the intensity of turbulence at jet stream altitudes and the production of waves near the surface. Keywords include: Wind, and MST radar.

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DESCRIPTORS: (U) *ATMOSPHERIC MOTION, *WIND VELOCITY, *WIND, PROFILES, MESOSPHERE, DIURNAL VARIATIONS, METEOROLOGICAL DATA, ANALYSIS OF VARIANCE, INTENSITY, REPRINTS, ALASKA, STATISTICAL ANALYSIS, CLIMATOLOGY, VERTICAL ORIENTATION, SEASONAL VARIATIONS, ALTITUDE, JET STREAMS, RADAR, STRATOSPHERE, TURBULENCE, TROPOSPHERE, HORIZONTAL ORIENTATION, SYNOPTIC METEOROLOGY

IDENTIFIERS: (U) MST(MESOSPHERE STRATOSPHERE TROPOSPHERE), Poker Flat(Alaska)

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FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

TELEDYNE GEOTECH ALEXANDRIA VA ALEXANDRIA LABS

(U) Comparison of Two Life Distributions on the Basis of Their Percentile Residual Life Functions.

(U) Frequency Dependence of Q in the Mantle Underlying the Shield Areas of Eurasia.

84 8P

DESCRIPTIVE NOTE: Final technical rept. 15 Nov 82-30 Dec 84.

PERSONAL AUTHORS: Joe, H.; Proschan, F.;

JAN 85 148P

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

REPORT NO. AL-85-1

MONITOR: AFOSR

CONTRACT NO. F49620-83-C-0040, ARPA Order-4493

TR-85-0189

PROJECT NO. 4493

TASK NO. 00

MONITOR: AFOSR
TR-85-0240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Canadian Jnl. of Statistics, v12 n2 p91-97 1984.

ABSTRACT: (U) The 100 alpha-percentile ($0 < \alpha < 1$) residual life function at time t is defined to be the 100 alpha-percentile of the remaining life given survival up to time t . In particular, when $\alpha = 0.5$, the median residual life function is obtained. The related mean residual life function is used in biometry, actuarial studies, and reliability. In situations similar to those where the median and other percentiles are preferred to the mean, the percentile residual life function will be a quantity of interest. Properties of percentile residual life functions are studied in Joe and Proschan (1984) and Haines and Singpurwalla (19749). In this paper, we consider inference problems for the comparison of two life distributions on the basis of their percentile residual life functions. Keywords include: Failure rate function, percentile residual life function, stochastic ordering, distribution-free two-sample test.

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS. LIFE TESTS. REPRINTS. RESIDUALS. STOCHASTIC CONTROL

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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ABSTRACT: (U) In Part I; the results of short and intermediate period data analyses for the determination of a frequency dependent Q model of the mantle under the shield areas of Eurasia are presented. The spectra of short period P waves from nuclear explosions in the 1-8 Hz frequency range give t^* sub $p \approx$ approx. 0.15-0.2 seconds. Part II presents analyses of long period data. Long period multiple S and SCS phases observed in northern Europe were analyzed to determine mantle attenuation in the 0.02 to 0.2 Hz range under the Eurasian shield. Two groups of events are used: deep Far-Eastern earthquakes and large earthquakes near the edges of the shield areas of Eurasia. Part III provides the Q model. A large set of broad band data was analyzed to determine the frequency and depth dependence of Q for P and S waves under the northern shield areas of Eurasia. A wide range of techniques utilizing spectra, amplitude ratios and waveform modeling were used to derive apparent and absolute t^* estimated for P and S waves covering the seismic band between 0.01 to 10 Hz. A supplement discusses methodologies for estimating $t^*(f)$ from Short Period Body Waves and Regional Variations of $t^*(f)$ in the United States. Keywords include: Attenuation.

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DESCRIPTORS: (U) *SEISMIC WAVES, *ATTENUATION, EARTH MODELS, PRIMARY WAVES(SEISMIC WAVES), SEISMIC DATA, SPECTRUM ANALYSIS, NUCLEAR EXPLOSION DETECTION, AMPLITUDE, RATIOS, BROADBAND, EURASIA, EARTH MANTLE, SHIELDING, DEPTH, FREQUENCY, EARTHQUAKES, EUROPE, NORTH(DIRECTION), NUCLEAR EXPLOSIONS, WAVEFORMS, SECONDARY WAVES, UNITED STATES

IDENTIFIERS: (U) Frequency dependence, Q models(Seismology), Continental shields, Northern Europe, Body waves(Seismology), PE61101E, WUAFDSR449300

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) In Situ Thin Film Measurement.

DESCRIPTIVE NOTE: Final rept..

DEC 84 46P

PERSONAL AUTHORS: Macleod, H. A. ;

CONTRACT NO. AFOSR-83-0353

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR
TR-85-0081

UNCLASSIFIED REPORT

ABSTRACT: (U) A scanning monochromator system for the monitoring of thin film deposition in a box coater is described. The system employs data from both a quartz crystal oscillator and a wide band transmission spectrometer. The spectrometer uses a holographic grating as its dispersive element and a CCD array to collect the data. All data is sent to a microcomputer where the information is displayed, stored, and analyzed. Several applications, including measurement of optical constants of optical constants of inhomogeneous films and characterization of moisture adsorption, are discussed.

DESCRIPTORS: (U) *THIN FILMS, COATINGS, MONOCHROMATORS, DEPOSITION, MEASUREMENT

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL
ENGINEERING

ABSORPTION, METAL VAPORS, PLASMA WAVES, PROPULSION
SYSTEMS, ELECTROMAGNETIC RADIATION, LASER APPLICATIONS,
ENERGY ABSORBERS, RARE GASES, LASER INDUCED FLUORESCENCE,
PRESSURE VESSELS

(U) A Plasma Initiation/Flow Chamber to Study CW Laser
Beamed Energy Absorption in Light Gases.

DESCRIPTIVE NOTE: Annual rept 1 Feb 83-30 Jan 84,

IDENTIFIERS: (U) Laser sustained plasmas, WUAFOSR2308A1,
PE81102F

MAR 84 75P

PERSONAL AUTHORS: Krier, H. ; Mazumder, J. ; Glumb, R. J. ;
Bender, T. D. ; Rockstroh, T. J. ;

REPORT NO. UTILU-ENG-84-4002

CONTRACT NO. AFOSR-83-0041

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0205

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the research work that has been done in the past year, investigating the use of laser-sustained plasmas for propulsion applications. One focus of the research is the initiation of plasmas in inert gases using metal vapor seedants. Another is to define the operating characteristics of the dual-flow design by measuring temperatures, number densities, and global absorption. A pressure chamber has been built to permit observations of the plasma under wide ranges of pressure, flow conditions, and beam geometry. Laser energy absorption will be measured using a high-flux calorimeter, and temperature profiles will be found using a combination of spectroscopic relative line intensity measurements, thermocouples, infrared thermography, and possible laser induced fluorescence. The report summarizes the design and construction of the pressure chamber, optics, and related equipment, and discusses the techniques which will be used to analyze temperatures throughout the flowfield. Keywords include: Beam energy propulsion, CW laser application, Absorption of electromagnetic radiation.

DESCRIPTORS: (U) *CONTINUOUS WAVE LASERS, RADIATION

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A151 229 17/9
MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA
(U) Data Quantization for Narrowband Signal Detection,
NOV 83 12P
PERSONAL AUTHORS: Cimini, L. J. ; Kassam, S. A. ;
CONTRACT NO. AFOSR-82-0022
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0191

AD-A151 228 12/1
FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS
(U) Statistical Aspects of Reliability, Maintainability
and Availability.
DESCRIPTIVE NOTE: Final rept. 30 Sep 83-29 Sep 84,
DEC 84 14P
PERSONAL AUTHORS: Hollander, M. ; Proschan, F. ;
CONTRACT NO. F49620-82-K-0007
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0003

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Aerospace and Electronics Systems, VAES-19 n6 p848-858
Nov 83.

ABSTRACT: (U) In automatic radar detection, digital integration of the envelope detector outputs is often used as a good approximation to the optimum. This requires quantizing the envelope detector outputs. In this paper, quantizer structures for narrowband signal detection are considered. Quantizer characteristics are derived to optimize performance as measured by the detector efficacy -- an asymptotic performance measure. Asymptotic and finite sample performance results are presented. The results obtained are not limited in their application to Gaussian noise only, although this important case is given specific consideration. Originator-supplied keywords: Optimum quantization; narrowband signals; optimum detection; non-Gaussian noise.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *ANALOG TO DIGITAL CONVERTERS, RADAR SIGNALS, CONVERSION, DIGITAL SYSTEMS, DEMODULATION, DETECTION, NARROWBAND

IDENTIFIERS: (U) Quantization, Envelope(Signals),
WUAFOSR2304A5, PE61102

UNCLASSIFIED REPORT

ABSTRACT: (U) This report documents the results of three years of operation of the Reliability Center at Florida State University. During this period 45 technical reports and 43 papers in journals were published on statistical aspects of reliability. In addition, 15 visiting researchers were supported at the Center. (Author).

DESCRIPTORS: (U) *STATISTICAL PROCESSES, REPORTS, DOCUMENTS, AVAILABILITY, MAINTAINABILITY, RELIABILITY

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

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year.

STANFORD UNIV CA DEPT OF CHEMISTRY

DESCRIPTORS: (U) *SIGNAL PROCESSING, *STATISTICAL PROCESSES, NARROWBAND, SIGNALS, DETECTORS, HYPOTHESES, TEST METHODS, MATCHED FILTERS, NONLINEAR SYSTEMS, OPTIMIZATION, ESTIMATES, IMAGE PROCESSING, DETECTION, MATHEMATICAL FILTERS, NONPARAMETRIC STATISTICS, QUANTIZATION

(U) Rotational Analysis of the BaI C2 P1 - X2 Sigma+ (O,O) Band.

84 13P

PERSONAL AUTHORS: Johnson, M. A. ; Noda, C. ; McKillop, J. S. ; Zare, R. N. ;

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

CONTRACT NO. F49620-83-C-0033

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFDSR
TR-85-0231

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Canadian Jnl. of Physics, v62
n12 p1467-1477 1984.

ABSTRACT: (U) Rotational analysis of the BaI C superscript 2 pi - X superscript 2 sigma + (O,O) band system has been performed using molecular beam and laser spectroscopic techniques. This band is free from local perturbations, although significant interaction of the C superscript 2 pi state with several other 2 sigma + states is indicated. The spin-orbit ordering of the C state is confirmed to be regular, while the A-doubling parameters p and q are opposite in sign. Apparent anomalies in the line strengths of various branches in the two spin-orbit sub-bands are related to observed differences in the hyperfine structure of the C-state spin-orbit components. Originator supplied keywords include: Rotational analysis, BaI, Laser spectroscopy, Spectroscopic.

DESCRIPTORS: (U) *BAND SPECTRA, *MOLECULAR BEAMS, LASER APPLICATIONS, PERTURBATIONS, ROTATION, HYPERFINE STRUCTURE, CANADA

IDENTIFIERS: (U) *Laser spectroscopy, WUAFOSR2303B1, PE61102F

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STATE UNIV OF NEW YORK AT BUFFALO DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA

(U) Field-Induced Phenomena in Electrical Insulation.

(U) Statistical Techniques for Signal Processing.

DESCRIPTIVE NOTE: Annual scientific rept. no. 1, 30 Sep
83-29 Sep 84.DESCRIPTIVE NOTE: Annual technical rept. 1 Nov 83-31 Oct
84.

SEP 84 128P

DEC 84 5P

PERSONAL AUTHORS: Laghari, J. R. ; Sarjeant, W. J. ; Gupta, R.
K. ;

PERSONAL AUTHORS: Kassam, S. A. ;

CONTRACT NO. AFOSR-83-0344

CONTRACT NO. AFOSR-82-0022

MONITOR: AFOSR
TR-85-0129

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0197

UNCLASSIFIED REPORT

ABSTRACT: (U) A review and an interpretation of the existing literature on dielectrics and dielectric breakdown was completed. Experiments were planned in light of the above interpretation and an experimental system was designed and developed. Experiments were then conducted on the time-to-break and breakdown of composite laminate insulation structures under pulsed and alternating voltages. Corona inception and extinction signatures were simultaneously obtained and evaluated. In view of the future experiments planned, theoretical and computer studies were carried out to determine the rise in temperature of laminate insulation structures under pulsed loads. Keywords include: Field, Electrical Insulation, Pulse Voltage, Corona-Interception, Corona-Extinction, Partial Discharge, Breakdown Temperature Rise.

DESCRIPTORS: (U) *ELECTRICAL INSULATION,
*BREAKDOWN/ELECTRONIC THRESHOLD, *DIELECTRICS,
ELECTRICAL CORONA, ELECTRIC DISCHARGES, INTERCEPTION,
COMPOSITE MATERIALS, LAMINATES, PULSES, VOLTAGE,
EXTINCTION, SIGNATURES

IDENTIFIERS: (U) Pulse voltage, Partial discharge

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UNCLASSIFIED REPORT

ABSTRACT: (U) The area of nonlinear edge-preserving robust smoothing was one area of focus for our research. In this area a dissertation was completed. We have been able to give deterministic and statistical characterizations of the performance of some useful types of nonlinear filters which may be thought of as arising from the classical robust estimates of location (L- and M-estimates), and we have demonstrated their applicability in image processing. We are continuing to obtain new results in this area in our current work. In the area of nonparametric detection the case of narrowband signals in noise has been studied. We have established the natural counterparts of the sign-detection schemes for this class of signals. This material is currently being prepared for publication in a technical journal. A paper on quantization of data in narrowband signal detection was also published during the last grant year. On the subject of optimum quantization of data for signal detection (hypothesis testing) a comprehensive exposition has been written for publication as a chapter in a book to be published next year. These results on statistical optimization of quantization in detection systems are of considerable interest for digital implementations. Currently being revised for publication also is a paper on optimum quantization in matched filtering and smoothing of data. Finally, a paper on multi-input robust Wiener smoothing was also published during the last grant

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ARIZONA UNIV TUCSON DIGITAL IMAGE ANALYSIS LAB

STUDIES, BANDWIDTH, OPTICAL PROCESSING, TOMOGRAPHY

(U) Feasibility Studies of Optical Processing of Image
Bandwidth Compression Schemes.

IDENTIFIERS: (U) PEG1192F, WUAFOSR230581

DESCRIPTIVE NOTE: Annual rept..

JUL 84 61P

PERSONAL AUTHORS: Hunt, B. R. ; Strickland, R. H. ;

REPORT NO. DIAL-84-00-4

CONTRACT NO. AFOSR-81-0170

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-85-0179

UNCLASSIFIED REPORT

ABSTRACT: (U) Research consists of several distinct and separate activities. The separate research efforts are unified by a common theme: the application of optical processing for image bandwidth compression. Within this common theme, however, the separate research projects are not completely related to each other. Therefore, this report is put together, literally, as a number of independent reports. The separate sections of the report, which follow this section, are intended to be read separately and independently of any other section. Each section has its own references and its own figure labelings, for example. The separate sections of this report, and the research problems dealt with in each section, are summarized in the following: (1) Data compression by multi-spectral staggered sampling, and data reconstruction by spatial and spectral interpolation; (2) Data compression by optical tomography, with data reconstruction by optical convolution and back projection; (3) Adaptive data compression by spatial transformations to create a spatially stationary image; and (4) Improvement of the optical data compression method known as IDPCM. Additional keywords: Computations; Algorithms.

DESCRIPTORS: (U) *IMAGE PROCESSING, DATA COMPRESSION,
OPTICAL DATA, ALGORITHMS, COMPUTATIONS, FEASIBILITY

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AD-A151 260 12/1

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES LOKER
HYDROCARBON RESEARCH INST

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) Photolysis of Polysilanes.

(U) A Spline Based Technique for Computing Riccati
Operators and Feedback Controls in Regulator Problems
for Delay Equations.

84 11P

DEC 84 27P

PERSONAL AUTHORS: Weber, W. P. ;

PERSONAL AUTHORS: Banks, H. T. ; Rosen, I. G. ; Ito, K. ;

CONTRACT NO. AFOSR-82-0333

CONTRACT NO. DAAG29-79-C-0161, AFOSR-81-0198

PROJECT NO. 2303

TASK NO. B2

PROJECT NO. 2304

MONITOR: AFOSR

TASK NO. A1

MONITOR: AFOSR
TR-85-0218

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Ultrastructure Processing of
Ceramics, Glasses, and Composites, ch24 p292-308 1984.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Sci. Stat.
Comput., v5 n4 p830-855 Dec 84.

ABSTRACT: (U) The general topic of this volume is ceramic materials. Yajima and coworkers, as well as others, showed that polysilanes can be converted to B-silicon carbide by a two-step pyrolysis reaction sequence. There may seem to be little connection between the photolysis of polysilanes and pyrolysis of polysilanes. It is, however, suggested that these two highly energetic processes, pyrolysis and photolysis, have much in common and that insights and understanding gained from one may be useful in comprehending the other. This is because these seemingly distinct processes share common reactive intermediates. The relationship between the high energy processes of mass spectrometry, pyrolysis, and photolysis in organic chemistry has been considered at length by Dougherty.

ABSTRACT: (U) This document considers the infinite interval regulator problem for systems with delays. A spline approximation method for computation of the gain operators in feedback controls is proposed and tested numerically. Comparison with a method based on averaging approximations is made. Keywords: Riccati equation; regulator problem; delay systems; spline approximations; reprints. (Author).

DESCRIPTORS: (U) *OPERATORS(MATHEMATICS), *RICCATI EQUATION, *SPLINES(GEOMETRY), *SPLINES, DELAY, REPRINTS, APPROXIMATION(MATHEMATICS), FEEDBACK, REGULATORS

DESCRIPTORS: (U) *CERAMIC MATERIALS, *PHOTOLYSIS, *POLYSILANES, SILICON CARBIDES, REPRINTS, PYROLYSIS, MASS SPECTROMETRY

IDENTIFIERS: (U) PE81102F, WUAFOSR230382

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SEARCH CONTROL NO. EVLO5A

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

CALIFORNIA INST OF TECH PASADENA DIV OF CHEMISTRY AND
CHEMICAL ENGINEERING

(U) Silacycloprenes. 2. 'Two-Atom' Insertion Reactions
of 1,1-Dimethyl-2, 3-bis(trimethylsilyl)silirene.

(U) Test of Variational Transition State Theory against
Accurate Quantal Results for a Reaction with Very
Large Reaction-Path Curvature and a Low Barrier.

84 11P

PERSONAL AUTHORS: Seyferth, D.; Vick, S. C.; Shannon, M. L.;

OCT 84 8P

CONTRACT NO. AFOSR-83-0003

PERSONAL AUTHORS: Kuppermann, A.; Truhlar, D. G.; Garrett, B.
C.; Hipes, P. G.;

PROJECT NO. 2303

CONTRACT NO. DAAG29-81-C-0015, AFOSR-82-0341

TASK NO. 82

PROJECT NO. 2303

MONITOR: AFOSR
TR-85-0233

TASK NO. B1

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-85-0230

SUPPLEMENTARY NOTE: Pub. in Organometallics, v3 n12 p1897-
1905 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) The silacycloprenes 1,1-dimethyl-2,3-
bis(trimethylsilyl)silirene reacts with aldehydes,
ketones, styrenes, conjugated terminal acetylenes,
benzynes, terminals 1,3-dienes, and a conjugated imine to
give five-membered cyclic organosilicon products in which
the C=O, C=C, C triple bond C, or C=N bonds of the
organic reactants have inserted into the Si-C bond of the
silirene ring. In the case of the C=C and C triple bond C
insertions, acyclic products, isomeric with the cyclic
products, are formed as well. The available evidence
suggests that a radical mechanism is operative. Keywords
include: Silacycloprenes, Organosilicon synthesis, and
Insertion reactions.

DESCRIPTORS: (U) *SILICON, *PROPENES, *CYCLIC COMPOUNDS,
*SYNTHESIS(CHEMISTRY), ALDEHYDES, STYRENES, KETONES,
ISOMERS

IDENTIFIERS: (U) Silirene/1,1-Dimethyl-2,3-
Bis(trimethylsilyl). Insertion, PE61102F, WUAFOSR230382

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UNCLASSIFIED

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EVLO5A

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v81
n8 p3542-3545, 15 Oct 84.

ABSTRACT: (U) We present three sets of calculations for
the thermal rate constants of the collinear reaction I+HI
yield IH+I: accurate quantum mechanics, conventional
transition state theory (TST), and variational transition
state theory (VTST). This reaction differs from previous
test scores in that it results by factors of 20 billion,
20,000, 57, and 19 at 40, 100, 300, and 1000 K
respectively. At these same four temperatures the ratios
of the VTST results to be accurate quantal ones are 0.3,
0.8, 1.1, and 1.4, respectively. We conclude that the
variational transition states are meaningful, even though
they are computed from a reaction-path Hamiltonian with
large curvature, which is the most questionable case.
Originator-supplied keywords include: Quantum Reactive
Scattering, Variational Transition State Theory.

DESCRIPTORS: (U) *QUANTUM CHEMISTRY, TRANSITIONS,
QUANTUM THEORY, CHEMICAL REACTIONS, REPRINTS

IDENTIFIERS: (U) VTST(Variational Transition State
Theory), Quantum reactive scattering, Transition state,
PE61102F, WUAFOSR230381

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DTIC REPORT BIBLIOGRAPHY

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AD-A151 266 4/2

COLORADO UNIV AT BOULDER DEPT OF MECHANICAL ENGINEERING

CONTROL DATA CORP MINNEAPOLIS MN

(U) Flow of Gas-Particle Mixtures.

(U) Detection of Synoptic-Scale Vertical Velocities Using an MST Radar.

DESCRIPTIVE NOTE: Final rept. 1 Oct 81-30 Sep 82.

NOV 83 15P

JAN 84 5P

PERSONAL AUTHORS: Brangh, M. C. ;

PERSONAL AUTHORS: Nastrom, G. D. ;

CONTRACT NO. AFOSR-82-0085

CONTRACT NO. F49620-82-C-0029

PROJECT NO. 2308

PROJECT NO. 2310

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR
TR-85-0237

MONITOR: AFOSR
TR-85-0210

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report outlines studies conducted to characterize the flow of a gas-particle mixture in an axisymmetric jet including the characterization of particle interactions with shock waves formed in the jet in compressible flow. The measurements made include profiles of axial and radial velocity components of the particles and turbulence characteristics of the flow. Flow visualization was used to measure particle concentration and the structure of the shock waves. Samples extracted from the flow provide the particle size distribution in the jet. These studies are needed because of the lack of a sufficiently detailed understanding of these flows, particularly particle-shock interactions, to verify existing computational techniques. Additional keywords: Two-phase flow; Exhaust plumes; Nozzle flow; and Jet mixing.

DESCRIPTORS: (U) *EXHAUST PLUMES. *JET MIXING FLOW. *TWO PHASE FLOW, COMPRESSIBLE FLOW, INTERACTIONS, PARTICLE COLLISIONS, RADIAL VELOCITY, TURBULENCE, FLOW VISUALIZATION, DISTRIBUTION, PARTICLE SIZE, SHOCK WAVES, NOZZLE GAS FLOW

IDENTIFIERS: (U) PE81102F WJAFOSR2308A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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DAYTON UNIV OH RESEARCH INST

(U) Threshold Electron Studies of Gas-Surface Interactions.

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-31 Oct 84.

JAN 85 20P

PERSONAL AUTHORS: Murray, P. T. ;

REPORT NO. UDR-TR-85-08

CONTRACT NO. AFOSR-83-0280

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0212

DESCRIPTORS: (U) *ELECTRON SPECTROSCOPY, *GAS SURFACE INTERACTIONS, *SURFACE ANALYSIS, COLLISIONS, ELECTRON BEAMS, ELECTRON TRANSITIONS, EXCITONS, LITHIUM FLUORIDES, KINETIC ENERGY, THIN FILMS, ELECTRON SCATTERING, EXCITATION, THRESHOLD EFFECTS

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A2

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this program was to test the feasibility of using Threshold excitation spectroscopy (TES) as a new method of performing surface analysis. The TES experiments entailed bombarding the specimen of interest with a beam of nearly monoenergetic electrons and detecting those electrons which underwent near total energy loss upon colliding with the target surface. The result of such collision was a scattered electron with a final kinetic energy close to zero. The program involved designing and constructing a threshold electron spectrometer which incorporated a steradiance filter to selectively detect low energy electrons. The feasibility experiments entailed using lithium fluoride thin films as the test specimen. The resulting threshold excitation spectrum exhibited peaks at 3.5, 4.5, and 6.3 eV; this was in excellent agreement with previous electron transmission studies in which peaks were attributed to optically forbidden excitonic transitions at the lithium fluoride surface. The fact that similar structure was observed in this program (with better energy resolution) demonstrated that TES is indeed a feasible method of performing surface analysis. Keywords include: Surface Analysis, Electron Energy Loss Spectroscopy, Threshold Excitation Spectroscopy, Thin Films, Lithium Fluoride.

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boundary conditions were used, the model ran for 8 hours, did not blow up, but developed unrealistically near the boundaries.

DESCRIPTORS: (U) *EARTH ATMOSPHERE, *ATMOSPHERE MODELS, *BOUNDARY LAYER, DUST, BOUNDARY LAYER TRANSITION, ATMOSPHERIC TEMPERATURE, TEMPERATURE INVERSION, ALTITUDE, THERMAL RADIATION, ONE DIMENSIONAL, TWO DIMENSIONAL, FLUX(RATE), LAYERS, TIME DEPENDENCE, DESERTS, PLANETARY ATMOSPHERES, ADVECTION, HEIGHT, INVERSION, MATHEMATICAL MODELS, TEMPERATURE, MOISTURE, SOILS, TRANSITIONS, WIND

IDENTIFIERS: (U) PEB1102F, WUAFOSR2310A1

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MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA
DEPT OF ELECTRICAL ENGINEERING AND SCIENCE

(U) Nonparametric Detection of Narrowband Signals.

JUN 84 5P

PERSONAL AUTHORS: Kassam, S. A. ;

CONTRACT NO. AFOSR-82-0022

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0192

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at Midwest Symposium on
Circuits and Systems (27th), Jun 84.

ABSTRACT: (U) For nonparametric detection of narrowband signals in narrowband noise the zero medians assumption of the low-pass known-signal detection problem becomes the zero marginal medians assumption on the in-phase and quadrature noise components. Detectors based on conditional counterparts of the low-pass sign correlator detector. In addition, the symmetry assumption on the noise probability densities in the univariate case becomes a diagonal symmetry assumption, for which conditional multi-level nonparametric detectors are defined. Additional keywords: Computations, and Statistical tests. (Author)

DESCRIPTORS: (U) *SIGNAL PROCESSING, NOISE(ELECTRICAL AND ELECTROMAGNETIC), DEMODULATORS, DETECTION, NARROWBAND, SIGNALS

IDENTIFIERS: (U) Nonparametric signal detection,
PEB1102F, WUAFOSR2304A5

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SEARCH CONTROL NO. EVLO5A

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AD-A151 286 4/1 20/4

TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

(U) Annual Scientific Report, Grant AFOSR-81-0205.

DESCRIPTIVE NOTE: Rept. for 15 Jun 83-14 Jun 84.

DEC 84 148P

PERSONAL AUTHORS: Chandy, K. M. ; Misra, J. ;

CONTRACT NO. AFOSR-81-0205

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0200

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Paradigms for Distributed Computing; Distributed Simulated; Processor Queueing Disciplines in Distributed Systems; The Effect of Queueing Disciplines on Response Times in Distributed Systems; The Drinking Philosopher's Problem; Distributed Snapshots; Determining Global States of Distributed Systems. Keywords: Distributed data processing. Asynchronous systems. Theory.

DESCRIPTORS: (U) *DISTRIBUTED DATA PROCESSING. PROCESSING. QUEUEING THEORY. COMPUTATIONS. COMPUTERIZED SIMULATION. REACTION TIME. THEORY. MATHEMATICAL MODELS. ASYNCHRONOUS SYSTEMS. DISTRIBUTION. PROBLEM SOLVING

IDENTIFIERS: (U) *Distributed computing. *Distributed systems. Drinking philosophers problem

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BEN-GURION UNIV OF THE NEGEV SEDE BOQER (ISRAEL) JACOB BLAUSTEIN INST FOR DESERT RESEARCH

(U) The Behavior of the Atmosphere in the Desert Planetary Boundary Layer.

DESCRIPTIVE NOTE: Final scientific rept. 15 Oct 83-14 Oct 84.

OCT 84 81P

PERSONAL AUTHORS: Berkofsky, L. ;

CONTRACT NO. AFOSR-84-0036

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-85-0227

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the aims of this investigation was to develop a limited area planetary boundary layer desert model for computers of limited power. We derived a general system of vertically integrated equations, including a dust concentration equation and an inversion height equation. The boundary layer was divided into a constant flux layer, a transition layer, and an inversion layer. The model equations predict the mean (vertically averaged) winds in the transition layer, the potential temperature at the top of the surface layer, the potential temperature at the ground, the height of the inversion layer, the dust concentration at the top of the surface layer, the moisture at the top of the surface layer, and the soil moisture at the ground. The radiation flux is also calculated as a function of time. Initially, the one-dimensional version was tested (no horizontal advection). All fields showed reasonable evolution for a twenty-four hour prediction. Data (dust concentration, inversion height) are now being gathered for verification. The two dimensional version was first run with a time step of two minutes and boundary conditions held fixed in time. Although the interior fields, starting from artificial initial data, developed reasonably, the calculations blew up after 4 hours, probably due to the restrictive boundary conditions. When the radiation

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MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF
ELECTRONICS

CIRCUITS, DIGITAL COMMUNICATIONS, ALGORITHMS, SIGNAL
PROCESSING

(U) Conversion of Algorithms to Custom Integrated Circuit
Devices.

DESCRIPTIVE NOTE: Final rept. 1 Nov 83-31 Oct 84.

JAN 85 34P

PERSONAL AUTHORS: Allen, J. ;

CONTRACT NO. F49620-84-C-0004

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR
TR-85-0175

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is devoted to the development of computer-aided design techniques at a fundamental and basic level for the creation of high-performance custom integrated circuits to be used for digital signal processing. The project takes a fundamental point of view in considering the design process to consist of a set of transformations between abstract representations at various levels. There are five major of the work. First, research on specification languages that characterize the functionality of the algorithm to be performed by the chip are considered. The second focus is on architectural exploration, whereby architectures derived from the input functional specification can be modified without any possibility of changing the desired input functionality. In the third area, we have focused on techniques for generation and composition of cells. The fourth area of emphasis is the characterization and generation of optimum circuit performance. Finally, attention has been focused on the design and construction of special architectures for computer aided design. The report describes these activities in detail and unifies them together in an overall perspective of computer aided design for high performance digital signal processing applications.

DESCRIPTORS: (U) *COMPUTER AIDED DESIGN, *INTEGRATED

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Some Imperfect Maintenance Models,

84 20P

properties of the distribution F p of the time between perfect repairs.

DESCRIPTORS: (U) *MAINTENANCE MANAGEMENT, *MAINTENANCE, MODELS, REPRINTS, FAILURE, RATES, POLICIES, PERIODIC FUNCTIONS

PERSONAL AUTHORS: Fontenot, R. A. ; Proshan, F. ;

IDENTIFIERS: (U) Imperfect repair, PEB1102F, WUAFOSR2304AS

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0188

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Reliability Theory and Models, p83-101 1984.

ABSTRACT: (U) During the past twenty-five years a large number of articles on maintenance policies have appeared. Most of these papers overlook two important factors in real-world maintenance operations: the possibility of errors on the part of the maintenance performer and limitations, physical or otherwise, which make complete overhaul of the unit needing repair impossible. Recently, however, several authors have treated imperfect maintenance, that is, maintenance in which one or both the factors just mentioned play a role. T. Nakagawa in discusses several models in which the repaired unit never has effective age zero and several other models in which the maintenance performer accomplishes planned periodic maintenance perfectly (i.e., the repaired unit is in as good as new) with probability p and performs only minimal repair (the unit is repaired so that it functions again, but has the same failure rate and the same effective age as at the time of failure) with probability 1-p. Got yhr isyrt models. Nakagawa also assumes that unplanned maintenance, the repair of intermittent failures, is always perfect. Two other authors, M. Brown and F. Proshan, discuss general features of imperfect maintenance and inspection in and develop properties of an imperfect repair model in. For their imperfect repair model, the authors assume that unplanned repair is perfect with probability p and is minimal repair with probability q=1-p. The main interest of the authors in is in studying

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SEARCH CONTROL NO. EVLOSA

AD-A151 334 12/1

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) A-Optimal Incomplete Block Designs for Control-Test Treatment Comparisons.

NOV 84 10P

PERSONAL AUTHORS: Hedayat, A. S. ; Majumdar, D. ;

CONTRACT NO. AFOSR-80-0170

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0185

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Technometrics, v28 n4 p363-370 Nov 84.

ABSTRACT: (U) A-optimal design for comparing v test treatments with a control in b blocks of size k each are considered. Several series of A-optimal are given when the parameters are in the range $2 < \text{or} = k < \text{or} = 8, k < \text{or} = v < \text{or} = 30, v < \text{or} = b < \text{or} = 50$. A-optimal designs in blocks of size 2 are extensively studied through a combination of theoretical results and numerical investigations. Tables of approximately A-optimal designs are given when A-optimal design are not easily available for the case $k = 2$. Keywords include: Control-test treatment comparisons; A-optimal designs; BTIB designs; and Augmented BIB designs.

DESCRIPTORS: (U) *CONTROL THEORY, OPTIMIZATION, NUMERICAL ANALYSIS

IDENTIFIERS: (U) *Block desins, PE61102F, WUAFOSR2304A5

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MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA

(U) Applications of Nonlinear Adaptive Filters for Image Enhancement.

84 4P

PERSONAL AUTHORS: Lee, Y. H. ; Kassam, S. A. ;

CONTRACT NO. AFOSR-82-0022

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0198

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the International Conference on Pattern Recognition, 1984, Montreal (Canada)

ABSTRACT: (U) Generalizations of median filters which combine desirable properties of both linear and nonlinear filters have recently been developed by the authors. This paper gives some results of applications of these filters in the enhancement of noisy images. The authors consider in particular the median, the alpha-trimmed mean (alpha-TM), the modified trimmed mean (MTM) and the double window (DW) MTM filters. In all but the last case iterated use of the filter has been examined. The results show that the new filters (MTM and DW MTM filters) are very good for edge-preserving enhancement of images contaminated by additive noise which includes impulsive components.

DESCRIPTORS: (U) *IMAGE PROCESSING, *ADAPTIVE FILTERS, IMPULSE NOISE, MODIFICATION

IDENTIFIERS: (U) *Image enhancement, Alpha trimmed mean filters, Modified trimmed mean filters, Double window modified trimmed mean filters, WUAFOSR2304A5, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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OREGON UNIV EUGENE DEPT OF PHYSICS

(U) L(1-L)(23)M(1) Coster-Kronig Spectrum of Argon in Intermediate Coupling.

AUG 84 3P

PERSONAL AUTHORS: Karim, K. R. ; Crasemann, B. ;

CONTRACT NO. F49820-84-C-0039, ARPA Order-4087

PROJECT NO. * 2301

TASK NO. A4

MONITOR: AFOSR
TR-85-0209

UNCLASSIFIED REPORT

Pub. in Physical Review A, v30 n2 p1107-1108 Aug 84.

ABSTRACT: (U) Transition energies and rates in the L sub 1-L sub 23 M sub 1 Coster-Kronig spectrum of argon have been calculated in the intermediate-coupling scheme. Strong mixing of the final ionic states P (1) sub 1 and P (3) sub 1, caused by the spin-orbit interaction, virtually removes the large discrepancy between previously calculated relative term intensities and experimental data. Transition energies also agree well. Keywords include: Coster-Kronig Transitions, Atomic Inner-shell Physics.

DESCRIPTORS: (U) *ATOMIC STRUCTURE, ATOMIC ENERGY LEVELS, REPRINTS, ARGON, TRANSITIONS, COUPLING(INTERACTION)

IDENTIFIERS: (U) Coster-Kronig Spectrum, Transition Energies, WUAFOSR2301A4, PE61102F

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PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS

(U) Determination of the Combustion Mechanisms of Aluminized Propellants.

DESCRIPTIVE NOTE: Final rept. 1 Oct 77-31 Oct 83.

NOV 83 24P

PERSONAL AUTHORS: Renie, J. P. ; Osborn, J. R. ;

CONTRACT NO. AFOSR-81-0249

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0238

UNCLASSIFIED REPORT

ABSTRACT: (U) The results are presented from research concerned with determining the mechanisms governing formation and subsequent combustion of metal/agglomerate particles throughout an aluminized solid rocket motor. Of primary concern is the influence these particles have on propellant combustion characteristics and overall motor performance. The approach taken involves making use of a laboratory scale, servo-controlled strand window bomb in conjunction with both an imaging-type, particle size analyzer and a pulse-lit photographic technique. In this paper, the servo-controlled strand window bomb is briefly described. The theory and operation of the imaging-type, particle size analyzer to be employed is detailed. Finally, the feasibility of using pulse-lit photography within a study of particle/agglomerate combustion is discussed along with the presentation of such photographs taken.

DESCRIPTORS: (U) *ALUMINIZED PROPELLANTS, *COMBUSTION, *SOLID PROPELLANT ROCKET ENGINES, PERFORMANCE(ENGINEERING), LABORATORY TESTS, PHOTOGRAPHY, AGGLOMERATES, METALS, PARTICLE SIZE, PARTICLES, ANALYZERS, BOMBS

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1

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JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

PROBABILITY, TRACKING, MARKOV PROCESSES, INTENSITY, MULTIPLICATION FACTOR, POISSON DENSITY FUNCTIONS, RANDOM VARIABLES, STATIONARY

(U) Inference and State Estimation for Stochastic Point Processes.

DESCRIPTIVE NOTE: Interim scientific rept. 1 Jan-31 Dec 84.

JAN 85 14P

PERSONAL AUTHORS: : Karr, A. F. ;

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0173

UNCLASSIFIED REPORT

ABSTRACT: (U) Stochastic point processes are models of points distributed randomly in some space; these points may represent, for example, locations (or even trajectories) of tracked objects, times and amounts of precipitation events, or failure times and modes of a complex system. This research project is directed toward two principal problems arising in applications of point processes: statistical inference for point processes whose probability law is unknown entirely or in part, and state estimation for partially observed point processes, i.e., minimum mean squared error reconstruction, realization-by-realization, of random variables that are not directly observable. These problems are examined in several (not disjoint) contexts: stationary point processes, Cox processes, multiplicative intensity processes and Poisson processes. Another thrust of the research is inference for stochastic processes based on point process samples, with the particular goal to investigate inference and state estimation for random fields given point process samples. This report documents results in the research for this period. Additional keywords: Markov processes. (Author)

DESCRIPTORS: (U) *ESTIMATES, *STATISTICAL INFERENCE, *STOCHASTIC PROCESSES, TRAJECTORIES, SAMPLING.

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MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Some Theorems on the Instability of the Exponential Back-Off Protocol.

(U) Percentile Residual Life Functions,

84 8P

JUN 84 12P

PERSONAL AUTHORS: Rosenkrantz, W. A. ;

PERSONAL AUTHORS: Joe, H. ; Proschan, F. ;

CONTRACT NO. AFOSR-82-0167

CONTRACT NO. F49820-82-K-0007

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0171

MONITOR: AFOSR
TR-85-0190

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Performance '84, p199-205
1984.

SUPPLEMENTARY NOTE: Pub. in Operations Research, v32 n3
p888-678 May-Jun 84.

ABSTRACT: (U) A martingale method is used to study the backlog of packets awaiting to be retransmitted using the 'exponential backoff protocol'. Under certain conditions it is shown that the backlog is a positive submartingale whose expectations become infinite as time goes to infinity i.e. the system is unstable. On the other hand it is shown that the expected number of packets that have been blocked k times remains finite for all time and this extends a result of Hajek.

DESCRIPTORS: (U) *THEOREMS, *EXPONENTIAL FUNCTIONS, PACKETS, REPRINTS

IDENTIFIERS: (U) Martingales, Protocols, PEB1102F, WJAFOSR2304A5

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, REPRINTS, MEAN, RESIDUALS

IDENTIFIERS: (U) Alpha percentile, WJAFOSR2304A5, PEB1102F

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SEARCH CONTROL NO. EVL05A

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FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Mean, Median, Mode III.

83 5P

PERSONAL AUTHORS: Dharmachikari, S. W. ; Joag-Dev, K. ;

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0193

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Statistica Neerlandica, v37
n4 p185-188 1983.

ABSTRACT: (U) Recently, Van Zwet discussed several conditions under which the celebrated mean-median-mode inequality holds. This note points out that Van Zwet's basic condition and its variants have a simple interpretation in terms of a well-known stochastic ordering. The results are slightly more general than Van Zwet's because the definition of unimodality used here (due to Khintchine) requires neither the existence of a density nor uniqueness of the mode. Keywords include: Mean-median-mode inequality; stochastic ordering; unimodality.

DESCRIPTORS: (U) *INEQUALITIES, STOCHASTIC PROCESSES, MEAN, REPRINTS, VARIATIONS

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

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EVL05A

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Wind Tunnel Wall Interference.

DESCRIPTIVE NOTE: Final rept. 1 Apr 82-31 Mar 83,

APR 84 95P

PERSONAL AUTHORS: Bliss, D. B. ; Lu, P. J. ;

CONTRACT NO. AFOSR-82-0158

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-85-0187

UNCLASSIFIED REPORT

ABSTRACT: (U) Behavior of isolated holes and slots in wind tunnel walls was studied. The aerodynamic characteristics of these individual wall elements can be used to help understand the behavior of walls with multiple perforations. Potential flow analysis similar to that employed in the kernel function approach to lifting surface theory was used to determine the pressure differential versus flowrate relationship for various hole planforms in high speed subsonic flow. The effect of an imposed pressure gradient was also analyzed. Good agreement with slender-body theory results was obtained for low aspect ratio planforms. Although the finite hole problem resembles the lifting wing problem, there are significant differences: the pressure differential is known and the free surface shape is unknown; the Kutta condition is applied to the hole leading edge; and there are no wake effects in the hole out-flow problem. The analysis was extended to include the effect of an inviscid rotational power law boundary layer over the hole by using a shear flow aerodynamics kernel function. The effect of the boundary layer was determined for transverse slots and holes with various planform shapes. Presence of a wall boundary layer tends to reduce the flow resistance coefficient and, since the layer thickness may be comparable to the hole size, the effect is reasonably strong.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

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DESCRIPTORS: (U) *BOUNDARY LAYER, *SUBSONIC FLOW, *HOLES(OPENINGS), *WIND TUNNELS, SHAPE, LIFTING SURFACES, ASPECT RATIO, COEFFICIENTS, RESISTANCE, THICKNESS, AERODYNAMIC CHARACTERISTICS, PERFORATION, FLOW RATE, INVISCID FLOW, BOUNDARY LAYER FLOW, FUNCTIONS(MATHEMATICS), POTENTIAL FLOW, SHEAR PROPERTIES, SLOTS, TRANSVERSE, INTERFERENCE, PRESSURE GRADIENTS, SLENDER BODIES, THEORY

IDENTIFIERS: (U) Wall interference, Kernel functions, Wind tunnel walls, Pressure differentials, Shear flow, WJAFOSR2307A1, PE81102F

AD-A151 211 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Point Processes Associated with Extreme Value Theory.

DESCRIPTIVE NOTE: Doctoral thesis.

DEC 84 84P

PERSONAL AUTHORS: Hsing, T. ;

REPORT NO. TR-83

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0204

UNCLASSIFIED REPORT

ABSTRACT: (U) This work demonstrates the application of point process theory in the context of statistical extremes. Consider a stationary random sequence which satisfies certain dependence restrictions. We study the asymptotic behavior of a sequence of point processes that record the positions at which extreme values occur. Necessary and sufficient conditions are given for the weak convergence of the sequence. It is found that the usual Poisson limit when the random sequence is i.i.d. is replaced by a compound Poisson limit. The asymptotic distributions of extreme order statistics are derived from the weak convergence result using simple combinatorial arguments. A class of point processes in two dimensions is also considered. The weak limit is characterized to be a cluster process which is determined by a homogeneous Poisson Process and the local dependence structure of the random sequence. A random sequence whose members are the weighted maxima of i.i.d. random variables is studied. It is shown that the sequence satisfies our dependence restrictions, and the point process results developed can be applied. Specific limit forms of the various point processes of interest are derived. (Author)

DESCRIPTORS: (U) *POINT THEOREM, STATISTICAL PROCESSES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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ASYMPTOTIC SERIES, CLUSTERING, POISSON EQUATION, POISSON
DENSITY FUNCTIONS, RANDOM VARIABLES, SEQUENCES,
STATIONARY, CONVERGENCE

IDENTIFIERS: (U) *Point processes, WUAFOSR2304AS,
PE61102F

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MACKAY SCHOOL OF MINES RENO NV

(U) The Suppression of Afterburning in Solid Rocket Plumes
by Potassium Salts.

DESCRIPTIVE NOTE: Interim rept. 30 Sep 83-29 Sep 84.

NOV 84 24P

PERSONAL AUTHORS: MILLER, E. ;

CONTRACT NO. AFOSR-83-0358

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0182

UNCLASSIFIED REPORT

ABSTRACT: (U) The exhaust plume of a minimum-smoke solid rocket contains significant concentrations of hydrogen and carbon monoxide which when mixed with ambient air react with water and carbon dioxide producing visible flash and increased infrared radiation. Both reactions produce undesirable signatures and interference with optical guidance systems. Potassium salts have been added to propellant charges to inhibit afterburning in both guns and rockets. They have not always been effective, the inhibiting effect of the salt being related to gas composition and temperature in a complex manner which is not completely understood. Further, there is disagreement as to whether it is KOH, K₂O, or K that is most important in the afterburning suppression. The results are presented here of the first year of the investigation on the efficacy of each of these on the combustion of diluted H₂/CO-D₂-N₂ mixtures. Potassium added to the fuel-side of a H₂-CO-D₂-N₂ flat diffusion flame at near stoichiometry is more effective in inhibiting the flame reactions than KOH added to a H₂-N₂-O₂ flame at a stoichiometric ratio of 0.61. A description is given of burner, optical and flow metering system used in experiments. Originator supplied keywords include: Rocket plume afterburning, Combustion, and Flame spectroscopy.

DESCRIPTORS: (U) *POTASSIUM COMPOUNDS, *SALTS, *EXHAUST PLUMES, *ROCKET EXHAUST, *AFTERBURNING, *FIRE SUPPRESSION,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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BURNERS, FLAMES, SPECTROSCOPY, FLOWMETERS, COMBUSTION,
SOLID PROPELLANT ROCKET ENGINES

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF
ELECTRONICS

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F

(U) Automated Circuit Extraction from Mask Descriptions of
MOS Networks.

DESCRIPTIVE NOTE: Master's thesis 15 Mar 81-29 Sep 83,

FEB 84 128P

PERSONAL AUTHORS: McCormick, S. P. ;

REPORT NO. TR-503

CONTRACT NO. F49620-81-C-0054, F49620-84-C-0004

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR
TR-85-0174

UNCLASSIFIED REPORT

ABSTRACT: (U) An automated circuit extractor generates an equivalent circuit description of an integrated circuit (IC) entirely from the geometric mask information. By analyzing the circuit description, IC performance can be estimated without having the IC design implemented. This thesis presents a methodology for accurate extraction of interconnection resistance, inter-nodal capacitance, ground capacitance, and transistor dimensions-circuit parameters important in characterizing in speed, noise-immunity, and static performance of designs for modern MOS technologies. Extracting each circuit parameter follows a general, numerical extraction algorithm with high accuracy. However, where possible, the general algorithms are replaced with simple techniques that do not sacrifice accuracy but execute much faster. Vital to the extraction methodology is a geometric operation that decomposes regions into domains appropriate for specialized algorithms and general algorithms.

DESCRIPTORS: (U) *COMPUTER AIDED DESIGN, *INTEGRATED CIRCUITS, GEOMETRY, MASKS, PERFORMANCE (ENGINEERING), ELECTRICAL RESISTANCE, CAPACITANCE, ALGORITHMS, EQUIVALENT CIRCUITS, EXTRACTION, THESES

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IDENTIFIERS: (U) WJAFOSR230583, PE81102F

OREGON STATE UNIV CORVALLIS DEPT OF PHYSICS

(U) Atomic Physics with Synchrotron Radiation,

JUN 84 9P

PERSONAL AUTHORS: Crasemann, B.; Willeumier, F. ;

CONTRACT NO. F49620-84-C-0039, ARPA Order-4087

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-85-0208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white. Pub. in Physics Today, p1-8 Jun 84.

ABSTRACT: (U) A powerful probe of the structure and dynamics of atoms promises not only to help solve problems in applied physics, but to test our understanding of quantum electrodynamics, relatively and many-body phenomena. Author keywords include: Synchrotron radiation, X ray physics.

DESCRIPTORS: (U) *NUCLEAR PHYSICS, *SYNCHROTRONS, *QUANTUM ELECTRODYNAMICS, REPRINTS, STRUCTURAL PROPERTIES, N BODY PROBLEM, X RAYS

IDENTIFIERS: (U) WJAFOSR2301A4, PE81102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A151 195

12/1

NORTH CAROLINA STATE UNIV AT RALEIGH

(U) Convergence of a Direct-Iterative Method for Large-Scale Least-Squares Problems.

84

14P

PERSONAL AUTHORS: Markham, T. L. ; Neumann, M. ; Plemons, R. J. ;

CONTRACT NO. AFOSR-83-0255

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0170

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Linear Algebra and Its Applications, p1-13 1984.

ABSTRACT: (U) In 1975 Chen and Gentleman suggested a 3-block SOR method for solving least-squares problems, based on a partitioning scheme for the observations matrix A where A sub 1 is square and nonsingular. In many cases A sub 1 obvious from the nature of the problem. This combined direct-iterative method was discussed further and applied to angle adjustment problems in geodesy, where A sub 1 is easily formed and is large and sparse, by Plemons in 1979. Recently, Neithammer, de Pillis, and Varga have rekindled interest in this method by correcting and extending the SOR convergence interval. The purpose of this paper is to discuss an alternative formulation of the problem leading to a 2-block SOR method. For this formulation it is shown that the resulting direct-iterative method always converges for sufficiently small SOR parameter, in contrast to the 3-block formulation. Formulas for the optimum SOR parameter and the resulting asymptotic convergence factor are given. Furthermore, it is shown that this 2-cyclic block SOR method always gives better convergence results than the 3-cyclic one for the same amount of work per iteration. The direct part of the algorithm requires only a sparse-matrix factorization of A sub 1. The authors' purpose here is to establish theoretical convergence results, in line with the purpose of the recent paper by Neithammer.

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) 1,1,1,5,5,5-Hexamethyltrisiloxane: Preparation and some Reactions.

(U) Unsteady Gas Dynamics Problems Related to Flight Vehicles.

84

8P

DESCRIPTIVE NOTE: Final rept. 1 Apr 79-31 Mar 84.

PERSONAL AUTHORS: Seyferth, D.; Prud'Homme, C. C.; Wang, W. L.;

MAY 84 10P

CONTRACT NO. AFOSR-83-0003

PERSONAL AUTHORS: Ashley, H.;

PROJECT NO. 2303

CONTRACT NO. AFOSR-79-0061

TASK NO. B2

PROJECT NO. 2307

MONITOR: AFOSR

TASK NO. A1

TR-85-0232

MONITOR: AFOSR
TR-85-0166

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry. v277 p203-209 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes research effort in unsteady aerodynamics and aeroelasticity. Keywords include: Vertical axis wind turbines; Chordwise forces; Wind tunnel wall interference.

ABSTRACT: (U) 1,1,1,5,5,5-Hexamethyltrisiloxane (I) was prepared by reaction of (Me₃SiO)₂Mg or of Me₃SiOH with dichlorosilane. Its selective chlorination to give mostly Me₃SiOSiHClOSiMe₃ and only a small amount of Me₃SiOSiCl₂OSiMe₃ was effected by its PdCl₂-catalyzed reaction with CCl₄. Originator supplied keywords include: Siloxanes, Silicon hydrides, Organosilicon synthesis.

DESCRIPTORS: (U) *AEROELASTICITY, *AERODYNAMICS, UNSTEADY FLOW, INTERFERENCE, WALLS, WIND TUNNELS, TURBINES, VERTICAL ORIENTATION, GAS DYNAMICS, AERODYNAMIC FORCES

DESCRIPTORS: (U) *SILOXANES, *SYNTHESIS(CHEMISTRY), ORGANIC COMPOUNDS, SILICON COMPOUNDS, HYDRIDES, METHYL RADICALS, SILANES, CHLORINATION, CATALYSIS, REPRINTS

IDENTIFIERS: (U) Unsteady aerodynamics, Wind turbines, Chordwise forces, Flight vehicles, PE61102F, WUAFOSR2307A1

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

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LEHIGH UNIV BETHLEHEM PA

discussed.

(U) Mechanisms of Corrosion Fatigue in High Strength I/M (Ingot Metallurgy) and P/M (Powder Metallurgy) Aluminum Alloys.

DESCRIPTORS: (U) *POWDER METALLURGY, *CORROSION, *FATIGUE(MECHANICS), *ALUMINUM ALLOYS, *HIGH STRENGTH ALLOYS, CHEMICAL ATTACK(DEGRADATION), STRENGTH(MECHANICS), MICROSTRUCTURE, CRACK PROPAGATION, MECHANICAL PROPERTIES, RELIABILITY, AIRCRAFT, CIVIL AVIATION, CORROSION RESISTANCE, AIR FORCE, LIFE EXPECTANCY(SERVICE LIFE), VAPOR PRESSURE, WATER VAPOR

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 81-30 Sep 84.

NOV 84 145P

PERSONAL AUTHORS: Wei, R. P. ; Pao, P. S. ;

IDENTIFIERS: (U) Corrosion fatigue, Ingot metallurgy, PE61102F, WUAFQSR2308A1

REPORT NO. IFSM-85-133

CONTRACT NO. F49620-81-K-0004

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0183

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with McDonnell Douglas Research Labs., St. Louis, MO.

ABSTRACT: (U) High strength aluminum alloys are employed extensively in the primary structure of current and projected Air Force and civilian aircraft. The service lives and reliability of these aircrafts depend to a great extent on the corrosion fatigue resistance of the structural alloys. Significant efforts are underway to develop powder metallurgy (P/M) alloys that would provide improved corrosion fatigue resistance along with improvements in other mechanical properties. The objective of this study was to understand the chemical and metallurgical aspects of environmentally assisted fatigue crack growth (or corrosion fatigue) that can serve (1) as a basis for guiding the development of new and improved alloys, and (11) as a basis for developing rational design procedures for service life predictions. The kinetics of fatigue crack growth, as a function of water vapor pressure and for water vapor-oxygen mixtures, and the accompanying fractographic observations on 7050-T7451, 7050-T851 and 7075-T851 (I/M) alloys and on 7091-T7E88 and 7091-T7E70 (P/M) alloys are described and

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MARYLAND UNIV COLLEGE PARK DEPT OF AEROSPACE
ENGINEERING

IDENTIFIERS: (U) PE61102F, WUAFOSR2307B1

(U) Development of a Dynamic Finite Element Model for
Unrestrained Flexible Structures.

DESCRIPTIVE NOTE: Final rept. 1 Sep 82-30 Jun 84.

OCT 84 145P

PERSONAL AUTHORS: Christensen, E. R. ; Lee, S. W. ;

CONTRACT NO. AFOSR-82-0296

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR-85-0183

UNCLASSIFIED REPORT

ABSTRACT: (U) An efficient finite element model and solution technique have been developed for the analysis of unrestrained flexible structures undergoing large elastic deformations coupled with gross nonsteady translational and rotational motions with respect to an inertial reference frame. The nonlinear coupled differential equations resulting from the finite element approximation are integrated timewise using an implicit-explicit split operator numerical integration scheme which treats the stability sensitive terms of the equation implicitly while the rest of the equation is treated explicitly. The motion of simple spacecraft structures consisting of flexible beams attached to rigid masses and including the effect of control forces has been studied using three-node eighteen-degree-of-freedom three dimensional beam elements based on the total Lagrangian description. Additional keywords: Space structures; Equations of motion; Stiffness matrix; Flexible spacecraft. (Author).

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *MATHEMATICAL MODELS, *FLEXIBLE STRUCTURES, INERTIAL SYSTEMS, DEFORMATION, ELASTIC PROPERTIES, SOLUTIONS(GENERAL), MATRICES(MATHEMATICS), EQUATIONS OF MOTION, SPACECRAFT, LAGRANGIAN FUNCTIONS, NONLINEAR DIFFERENTIAL EQUATIONS, STIFFNESS

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AD-A151 182 17/10 18/3

IOWA STATE UNIV AMES ENGINEERING RESEARCH INST

TELEDYNE GEOTECH ALEXANDRIA VA ALEXANDRIA LABS

(U) Application of Adaptive Grids in Solving the Partial Differential Equations Governing Fluid Flow.

(U) Testing the Hypothesis of TTBT (Threshold Test Ban Treaty) Compliance, and Magnitude-Yield Regression for Explosions in Granite.

DESCRIPTIVE NOTE: Final rept. 1 May 83-31 Jul 84.

DESCRIPTIVE NOTE: Final technical rept. 15 Nov 82-30 Dec 84.

SEP 84 80P

PERSONAL AUTHORS: Anderson, D. A.; Hindman, R. G.;

DEC 84 53P

REPORT NO. ISU-ERI-AMES-85412

PERSONAL AUTHORS: Shumway, R. H.; Rivers, D. W.;

CONTRACT NO. AFOSR-83-0187

REPORT NO. AL-84-7

PROJECT NO. 2307

CONTRACT NO. F49620-83-C-0040, ARPA Order-4493

TASK NO. A1

PROJECT NO. 4493

MONITOR: AFOSR

TASK NO. 00

TR-85-0188

MONITOR: AFOSR

TR-85-0241

UNCLASSIFIED REPORT

ABSTRACT: (U) A brief review of the goals and progress of the research on adaptive grid generation is presented. The principal results of the research are given by four papers supported by Grant AFOSR-83-0187 which comprise the appendix: Adaptive Grid Methods for Partial Differential Equations from Advances on Grid Generation, and AIAA papers 84-1608, 84-1610, and 84-1668. Keywords: Grid generation; Adaptive grids; Multidimensional; Finite difference methods.

DESCRIPTORS: (U) *FLUID FLOW, PROBLEM SOLVING, ADAPTIVE SYSTEMS, GRIDS, FINITE DIFFERENCE THEORY, NUMERICAL METHODS AND PROCEDURES, PARTIAL DIFFERENTIAL EQUATIONS

IDENTIFIERS: (U) Adaptive grid method, PE61102F, WUAFOSR2307A1

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UNCLASSIFIED REPORT

ABSTRACT: (U) Verification of the Threshold Test Ban Treaty (TTBT) cannot be performed merely by estimating explosive yields on the basis of observed seismic magnitudes and concluding that a violation has occurred if one or more yield estimates exceed the TTBT limit of 150 KT. It is necessary to take into account the uncertainties in the seismic magnitudes, in the magnitude - yield relation, and especially in the magnitude bias between the test site at which the magnitude - yield calibration explosions were detonated and the test site of the explosions being monitored. For monitoring one explosion at a time, these uncertainties can be taken into account by placing confidence limits around the yield estimates. For verifying TTBT compliance of an ensemble of explosions considered as a whole, however, this technique cannot be used, since the confidence limits placed around the yield estimates of different explosions are correlated due to the use in every case of the same values of the parameters relating magnitude to yield. In order to examine TTBT compliance for groups of explosions, a test can be performed of the hypothesis that the yields have some fixed distribution in which all the values are less than 150 KT.

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

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DESCRIPTORS: (U) *YIELD(NUCLEAR EXPLOSIONS), *SEISMIC DETECTION, *SEISMIC DATA, NUCLEAR EXPLOSION TESTING, NUCLEAR EXPLOSION DETECTION, CORRELATION, BIAS, REGRESSION ANALYSIS, CONFIDENCE LIMITS, TEST FACILITIES, TREATIES, ESTIMATES, GRANITE, HYPOTHESES, THRESHOLD EFFECTS, CALIBRATION

WYOMING UNIV LARAMIE DEPT OF BIOCHEMISTRY

(U) Purification and Sequence of an Opioid Peptide Derived from Ovine Proenkephalin.

JAN 84 6P

IDENTIFIERS: (U) TTBT(Threshold Test Ban Treaty), Seismic magnitude, Verification, PE81101E, WUAFDSR449300

PERSONAL AUTHORS: Micanovic, R. ; Ray, P. ; Kruggel, W. ; Lewis, R. V. ;

CONTRACT NO. AFOSR-83-0208

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-85-0176

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biochemical and Biophysical Research Communications, v118 n1 p299-303, 13 Jan 84.

ABSTRACT: (U) An enkephalin-containing peptide originating from adrenal proenkephalin has been purified and sequenced. The sequence of the peptide is: GLY-GLY-GLU-VAL-LEU-GLY-LYS-ARG-TYR-GLY-GLY-PHE-MET (preproenkephalin 128-140) which represents a portion of peptide F (preproenkephalin 107-140). This peptide has a sequence identical to that of bovine preproenkephalin 128-140 while it differs from the corresponding human sequence in positions 129, 131, and 133.

DESCRIPTORS: (U) *PEPTIDES, PURIFICATION, REPRINTS

IDENTIFIERS: (U) *Opioid peptides, Proenkephalin, Enkephalin, PE81102F, WUAFDSR2917A4

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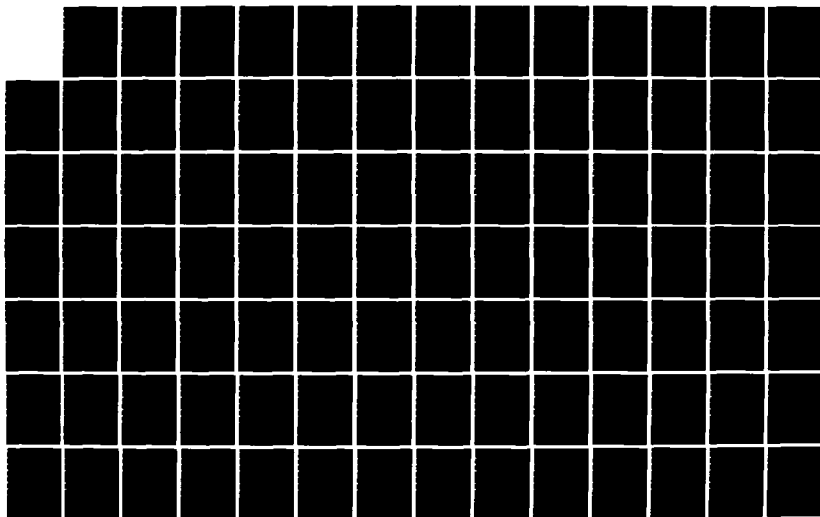
AFOSR TECHNICAL REPORT SUMMARIES SECOND QUARTER CY 1985
(U) AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB
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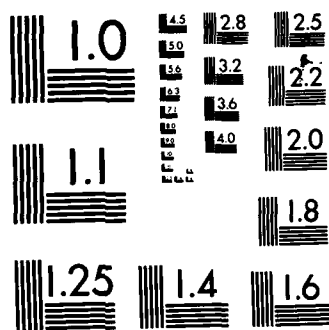
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MASSACHUSETTS INST OF TECH CAMBRIDGE FRANCIS BITTER
NATIONAL MAGNET LAB

IDENTIFIERS: (U) PE81102F, WUAFOSR2308C1

(U) Synthesis and Characterization of Superconducting
Electronic Materials.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 82-30 Sep
84.

NOV 84 17P

PERSONAL AUTHORS: Meservey, R. H.; Tedrow, P. M.; Orlando, T.
P.;

CONTRACT NO. F49620-82-K-0028

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-85-0117

UNCLASSIFIED REPORT

ABSTRACT: (U) Specialized vacuum deposition systems were developed with the necessary monitoring and control to synthesize or react refractory superconducting films. NbN, VN, NbTi, and VTi films of high quality have been produced and their transport and tunneling properties studied. Ultra-thin films of pure Nb have been successfully made to study spin-orbit scattering in transition metals. The structural properties and penetration depth of NbN films prepared by reactive sputtering have been studied. Many-body effects which are important in superconductivity have been observed by spin-polarized tunneling and the antisymmetric Fermi liquid parameter has been measured for the first time in Al. The technique of deconvoluting tunneling conductance curves to obtain the superconducting density of states has been improved. A comprehensive study was made of amorphous Ge tunnel barriers between superconductors. (Author).

DESCRIPTORS: (U) *SUPERCONDUCTORS, SPIN STATES, DENSITY, REFRACTORY COATINGS, SYNTHESIS, SPUTTERING, SCATTERING, TRANSITION METALS, DEPTH, PENETRATION, FILMS, STRUCTURAL PROPERTIES, SUPERCONDUCTIVITY, TUNNELING, VACUUM DEPOSITION, THIN FILMS

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COLUMBIA UNIV NEW YORK COLUMBIA ASTROPHYSICS LAB

(U) A Program of Ground-Based Astronomy to Complement
Einstein Observations.

formation in supernova explosions and the time
development of the luminosity and size of the expanding
supernova shock wave.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Oct 83-30 Sep
84.

DESCRIPTORS: (U) *ASTRONOMICAL OBSERVATORIES. *STARS.
*WIND. *CORONAS. *SUPERNOVAE. EMISSION. ENERGY. SPECTRAL
ENERGY DISTRIBUTION. CLUSTERING. GALAXIES. X RAY
ASTRONOMY. LUMINESCENCE. SHOCK WAVES. NEBULAE,
SYNCHROTRONS

NOV 84 22P

PERSONAL AUTHORS: Helfand, D. J. ;

IDENTIFIERS: (U) Neutron Stars, PE8102F, WUAFOSR2311A1

REPORT NO. CAL-1553

CONTRACT NO. AFOSR-82-0014, 82-00208

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-85-0180

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the funded research is the formulation and execution of ground-based astronomical observations and interpretive studies complementary to the X-ray data accumulated with the Einstein satellite, to be used in addressing a number of questions of current astrophysical interest. During the past year, the program focussed on two main topics: the processes leading to high energy emission in the winds and coronae of late-type stars, and the structure and evolution of supernova remnants and the neutron stars they may contain. The stellar work encompasses the development of a complete, X-ray flux-limited sample of stars which, when combined with our complete, magnitude-limited optical sample will provide the best available description of the distribution of coronal activity in stars of spectral types F through M. A principal corollary of this work is the determination of the contribution of coronally active M-dwarfs to the diffuse X-ray background. Star cluster studies are combined with the survey work toward the goal of specifying the critical factors governing the production and evolution of magnetically dominated coronae in late-type stars. The supernova remnant work concentrates on the twin problems of the evidence for and frequency of neutron star

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STANFORD UNIV CA DEPT OF MATERIALS SCIENCE AND
ENGINEERING

TEMPERATURE, DISPERSION HARDENING, OXIDES,
STRENGTH(MECHANICS), FRACTURE(MECHANICS), FLOW,
PRECIPITATES, TWINNING(CRYSTALLOGRAPHY), PLASTIC
PROPERTIES, SUPERALLOYS

(U) An Investigation of the Structure and High Temperature
Mechanical Properties of Oxide Dispersion Strengthened
Alloys.

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F

DESCRIPTIVE NOTE: Interim scientific rept. 1 Oct 83-30
Sep 84.

DEC 84 47P

PERSONAL AUTHORS: Nix, W. D. ;

CONTRACT NO. AFOSR-81-0022

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0184

UNCLASSIFIED REPORT

ABSTRACT: (U) The structure and high temperature mechanical properties of oxide dispersion strengthened alloys are being studied. We have studied the creep and fracture properties of Inconel MA754 at very high temperatures. These properties depend both on the size distributions of the Y2O3 dispersoids (which have been measured with small angle X-ray scattering) and on the morphology of the grain structure. We have also studied the high temperature flow properties of Al-Fe-Ce alloys made by RSR techniques. We have shown that the particles which strengthen this alloy are monoclinic Al13Fe4. The high temperature strength of the alloy is found to be limited both by coarsening of the precipitates and by precipitate twinning. Efforts to improve the high temperature strength of Al-Fe-Ce by mechanical alloying are underway. These studies include the development of techniques for making TEM thin foils from powders. Originator-supplied keywords include: Oxide dispersion strengthened metals, Solute strengthening, Dispersion strengthening, ODS superalloys, Superplasticity, and Creep strength.

DESCRIPTORS: (U) *THERMAL PROPERTIES, *GRAIN
STRUCTURES(METALLURGY), *ALLOYS, CREEP STRENGTH, HIGH

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AD-A151 104 14/2 17/8 20/4 21/2

SPECTRON DEVELOPMENT LABS INC COSTA MESA CA

SPECTRON DEVELOPMENT LABS INC COSTA MESA CA

(U) Aerodynamic Droplet Breakup.

(U) Droplet Sizing Research.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 82-30 Jan 83.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 83-15 Jan 84.

MAY 83 28P

MAR 84 73P

PERSONAL AUTHORS: Craig, J. E. ;

PERSONAL AUTHORS: Hess, C. F. ;

REPORT NO. SDL-83-2193-09

REPORT NO. SDL-84-2286-06

CONTRACT NO. F49620-81-C-0032

CONTRACT NO. F49620-83-C-0080

PROJECT NO. 2308

PROJECT NO. 2308

TASK NO. A1

TASK NO. A3

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0206

TR-85-0207

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) As a result of previous research, we felt that accurate droplet velocity measurements would help produce scaling laws and provide better interpretation of the holographic droplet images. Therefore, we proceeded with a series of velocimetry experiments designed to provide accurate droplet profile and trajectory data. After completing the velocimetry experiments with conventional liquids, we proceeded with the liquid metals experiments. The results of the velocimetry experiments are summarized. The experiments with liquid metals are described in detail. Keywords include: Droplet breakup, Fragmentation; Droplet dynamics/Nozzles; Scaling laws--Critical Weber number, Breakup time; Fragment size; and Liquid metals--Mercury and Aluminum.

DESCRIPTORS: (U) *DROPS, AERODYNAMICS, LIQUIDS, MEASUREMENT, VELOCITY, FRAGMENTATION, LIQUID METALS, TRAJECTORIES, ALUMINUM, NOZZLES, FRAGMENTS, SIZES(DIMENSIONS), HOLOGRAPHY, IMAGES, SCALING FACTORS, VELOCIMETERS, PARTICLE SIZE, MERCURY

IDENTIFIERS: (U) Holographic images, Droplet breakup, Breakup time, Weber number, WUAFOSR2308A1, PE61102F

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ABSTRACT: (U) The objective of this research program is to advance the understanding of droplet sizing technology in combustion environments using light scattering. Two techniques which offer great potential in the measurement of sprays are studied. The first, referred to as IMAX, consists of a nonintrusive pulse height analyzer. The second, referred to as visibility/intensity (V/I), performs a size measurement by examining the visibility and the pedestal intensity of a Doppler burst. Research conducted this past year indicated that the IMAX technique provided a larger dynamic range and higher accuracy than V/I. It also showed that the two-color IMAX concept provided a higher S/N primarily because of the high efficiency in spectrally separating the two signals. Results obtained with these techniques for two kinds of sprays are discussed. Excellent resolution and self-consistency was experienced with IMAX when measuring the same spray using three different size ranges. Both techniques showed excellent resolution when measuring bimodal and trimodal sprays. A probe volume algorithm was developed and tested, and it appears to be very promising in the measurement of mass flux and local number density. Keywords include: Single particle counter, Doppler, Particle size velocity; and Mass flux.

DESCRIPTORS: (U) *PARTICLE SIZE, *DROPS, COMBUSTION,

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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DYNAMIC RANGE, ACCURACY, DENSITY, FLUX(RATE), MASS FLOW, MEASUREMENT, VELOCITY, EFFICIENCY, LIGHT SCATTERING, MEASUREMENT, SPRAYS, DISTRIBUTION, OPTICAL PROPERTIES, DOPPLER EFFECT, SPECTRUM ANALYSIS, RESOLUTION, ALGORITHMS, PROBES, VOLUME, PARTICLE COUNTERS, INTENSITY, VISIBILITY, PULSE HEIGHT ANALYZERS

FLORIDA UNIV GAINESVILLE DEPT OF MATHEMATICS

(U) Progress Report, Grant AFOSR-84-0365.

DESCRIPTIVE NOTE: Rept. for 1 Sep-31 Dec 84.

JAN 85 3P

IDENTIFIERS: (U) IMAX technique, Pedestal intensity, Size distribution, WUAFOSR2308A3, PE61102F

PERSONAL AUTHORS: Lasiecka, I. ;

CONTRACT NO. AFOSR-84-0365

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0172

UNCLASSIFIED REPORT

ABSTRACT: (U) Results have been obtained for certain second order hyperbolic systems with viscous damping which imply that one can increase 'at will' the margin of stability of arbitrarily finite modes of the damped wave equation (those presumed 'dominant') by means of certain type of the boundary feedback, while the remaining new modes approach asymptotically the original ones from the left of the vertical axis $\text{Re } z = -k$. Numerical testing of the constructive procedure is in the process of being implemented by a Ph.D. student. (Author)

DESCRIPTORS: (U) *DAMPING, *WAVE EQUATIONS, PARTIAL DIFFERENTIAL EQUATIONS, BOUNDARIES, FEEDBACK, STABILITY, HYPERBOLAS, VISCOSITY, NUMERICAL ANALYSIS

IDENTIFIERS: (U) Boundary feedback, PE61102F, WUAFOSR2304A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

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AD-A151 091 CONTINUED

ENSCO INC SPRINGFIELD VA SIGNAL ANALYSIS SYSTEMS DIV

(U) Relative Lg and P-Coda Magnitude Analysis of the
Largest Shagan River Explosions.

AMPLITUDE, FREQUENCY, LONG RANGE (DISTANCE), SEISMIC WAVES,
NUCLEAR EXPLOSIONS, UNDERGROUND EXPLOSIONS, SEISMIC DATA,
USSR

DESCRIPTIVE NOTE: Final rept. 2 Apr-31 Oct 84.

IDENTIFIERS: (U) Lg seismic waves, P coda seismic waves,
PE62714E, WUAFOSR489102

DEC 84 91P

PERSONAL AUTHORS: Baumgardt, D. R. ;

REPORT NO. SAS-TR-84-03

CONTRACT NO. F49620-84-C-0040, ARPA Order-4891

PROJECT NO. 4891, 3A10

TASK NO. 02

MONITOR: AFOSR
TR-85-0235

UNCLASSIFIED REPORT

ABSTRACT: (U) Characteristics of P-coda and Lg measurements at the NORSAR (Norwegian Seismic Array) and Graefenburg (West Germany) arrays were studied for presumed underground nuclear explosions in the Semipalatinsk region of the Soviet Union. The main objectives were to investigate the effects of the propagation paths in western Russia on the narrowband and broadband recordings of Lg at teleseismic distances and to study the relative P-coda and Lg amplitudes recorded at these two arrays for the largest ($m \text{ sub } b > \text{ or } = 6.0$) Shagan River explosions. Comparison of broadband recordings of teleseismic Lg at Graefenburg ($\Delta = 42^\circ$) with narrowband NORSAR ($\Delta = 38^\circ$) and filtered Graefenburg recordings of Lg from Shagan River events reveals that Lg is more obvious, relative to the preceding P-coda, on broadband seismograms than on high-frequency seismograms. Broadband recordings of Lg at Graefenburg are about 0.5 log units stronger in the 0.2 - 1.0 Hz band than in the 0.8 - 3.0 Hz range although noise is also correspondingly higher. The early P-coda at NORSAR is stronger, relative to Lg, than that at Graefenburg. Also, the coda-envelope shapes are quite different for the two arrays.

DESCRIPTORS: (U) *SEISMIC ARRAYS, SEISMIC DETECTION,

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A151 090 12/1 15/5

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) An Iterative Scheme for Approximating Optimal Replacement Policies.

84 28P

PERSONAL AUTHORS: Quinn, J. ;

CONTRACT NO. AFOSR-80-0245

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0199

UNCLASSIFIED REPORT

Pub. in Reliability Theory and Models, p115-139 1984.

ABSTRACT: (U) A system subject to wear and/or damage is modeled by a stochastic process X. A replacement policy is a Markov time which determines system replacement in terms of the wear/damage history. In this paper, an iterative scheme for obtaining approximately optimal replacement policies is developed. The implementation of the scheme for certain Markovian wear/damage models is discussed and is implemented for exponentially distributed compound Poisson processes.

DESCRIPTORS: (U) *ITERATIONS, *REPLACEMENT THEORY, POISSON DENSITY FUNCTIONS, MARKOV PROCESSES, WEAR, POLICIES, HISTORY, OPTIMIZATION, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

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AD-A151 081 21/8.2 21/9.2 21/2

UNITED TECHNOLOGIES CORP SUNNYVALE CA CHEMICAL SYSTEMS DIV

(U) Coupling between Velocity Oscillations and Solid Propellant Combustion.

DESCRIPTIVE NOTE: Final rept. 15 Mar 83-15 Aug 84.

AUG 84 145P

PERSONAL AUTHORS: Brown, R. S. ; Blackner, A. M. ; Willoughby, P. G. ; Dunlap, R. ;

REPORT NO. CSD-2749-AR-3

CONTRACT NO. F49620-81-C-0027

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0100

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies are being conducted to define and characterize the basic fluid mechanics and heat transfer mechanism controlling the coupling between acoustic and radial profiles of the mean and oscillatory velocity are being measured at several axial stations in a cold flow rocket simulator. Recent studies have concentrated on measuring the structure of the acoustic waves and how this structure relates to the oscillatory heat flux data reported earlier. In particular, the radial profiles of the magnitude and phase (relative to the head end acoustic pressure) of the acoustic velocity have been measured at several axial stations. At low acoustic pressures (i.e., 0.05%) the acoustic waves extend across the entire cross-section in the region upstream of the transition in the mean velocity profile. Nonplanar and nonlinear behavior is also observed in the near surface regions. Downstream of the velocity transition, the acoustic waves do not penetrate through the near wall turbulence. At higher acoustic pressures (i.e., 0.4%) the upstream nonlinearities increase in magnitude and extend across the entire port. Downstream of the velocity transition the core nonlinearities decay while the linear component penetrates through the turbulence to the wall.

AD-A151 081

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A151 081 CONTINUED

AD-A151 080 12/1 9/5 22/2

Originator-supplied keywords include: Velocity coupling; and Combustion instability.

DESCRIPTORS: (U) *SOLID PROPELLANT ROCKET ENGINES, *COMBUSTION STABILITY, *COUPLING(INTERACTION), *VELOCITY, SOLID ROCKET PROPELLANTS, HEAT FLUX, RADIAL FLOW, ACOUSTIC WAVES, FLUID MECHANICS, HEAD(FLUID MECHANICS), ACOUSTIC VELOCITY, COLD FLOW, SIMULATORS, NONLINEAR SYSTEMS, HEAT TRANSFER, TURBULENCE, SOUND PRESSURE, OSCILLATION, COMBUSTION

IDENTIFIERS: (U) WUAFOSR2308A1, PE6110ZF

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Modelling of Flexible Surfaces. A Preliminary Study.

84 14P

PERSONAL AUTHORS: Banks, H. T.; Majda, G.;

REPORT NO. LCDS-83-13

CONTRACT NO. AFOSR-81-0198

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0169

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematical Modelling, v5
p103-115 1984.

ABSTRACT: (U) Reprints we give a careful derivation of the 1-dimensional classical scalar 'string' equation which involves linearization about a horizontal reference or equilibrium position. We then derive a model for small motion about a nonhorizontal reference. The implications of our findings to modelling of flexible antenna surfaces such as that in the Maypole Hoop/Column antenna are discussed. The investigations are motivated by our interest in equations governing the antenna surface in large space antennas such as the Maypole Hoop/Column configuration. This antenna consists of a gold-plated molybdenum reflective mesh surface stretched over a collapsible hoop that supplies the rigidity necessary to maintain the outer circular shape of the antenna. Of fundamental interest in estimation and control of the antenna are accurate models for the flexible membrane-like mesh surface. Rather than attempt a full 3-dimensional model for the surface, we analyze carefully a 1-dimensional flexible 'membrane' - i.e., a 'string'. One might view this string as a section of the antenna surface obtained by passing a vertical plane through the antenna.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *FLEXIBLE

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A151 080 CONTINUED

STRUCTURES, *SPACECRAFT ANTENNAS, *SURFACES, EQUATIONS,
MEMBRANES, FLEXIBLE MATERIALS, ONE DIMENSIONAL,
EQUILIBRIUM(GENERAL), MOTION, LINEARITY, REPRINTS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1

AD-A151 079 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) An Asymptotic Comparison between Maximum Likelihood
and Method of Moments in a Particular Errors-in-
Variables Regression Model.

84 11P

PERSONAL AUTHORS: Carroll, R. J.; Gallo, P. P.;

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0053

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Design of Experiments, p289-
278 1984.

ABSTRACT: (U) The authors study a particular functional
errors-in-variables regression model. In the case of no
equation error (all randomness due to measurement errors),
they show that the maximum likelihood estimator computed
assuming normality is asymptotically better than the
usual moments estimator, even if the errors are not
normally distributed. Keywords includes: Errors-in-
variable regression model; Randomness; Maximum likelihood
estimator; and Reprints.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *REGRESSION
ANALYSIS, *VARIABLES, COMPARISON, METHOD OF MOMENTS,
MAXIMUM LIKELIHOOD ESTIMATION, EQUATIONS, ERRORS,
NORMALITY, REPRINTS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

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AD-A151 077 6/16 6/1 6/15 5/10 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A
AD-A151 077 CONTINUED

CALIFORNIA UNIV IRVINE DEPT OF PHARMACOLOGY

(U) Neuronal Mechanisms of Intelligence.

DESCRIPTIVE NOTE: Final technical rept. 30 Jun 81-29 Jun 84.

NOV 84 74P

PERSONAL AUTHORS: Stein, L. ; Belluzzi, J. D. ;

CONTRACT NO. F49620-81-K-0015

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-85-0073

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this research program was to identify the functional unit in the brain for reward or positive reinforcement. On the assumption that the simplest possible unit is the single brain cell, we have attempted to reinforce individual neuronal firing patterns by direct applications of neurotransmitters or drugs to the cell soma. Our most satisfactory experiments have been performed on large pyramidal cells in hippocampal brain slices. The probability of neuronal firing increased sharply when reinforced by contingent applications of dopamine or cocaine; the same injections applied independently of neuronal firing had no such effect and in fact tended to suppress activity. There is an indication of pharmacological specificity: included among substances that are ineffective are GABA, serotonin, acetylcholine, imipramine, ethanol, and saline. Some features of behavioral operant conditioning are not observed in the neuronal experiments; reinforcement schedules are ineffective and relearning is not enhanced. Such features thus may reflect properties of neuronal systems rather than of individual cells. Finally, we have begun to consider the biochemical events that may mediate the cellular reinforcement process. Proteins that control cellular firing rates may be modified (phosphorylated) via biochemical cascade involving the conjunction of Ca(++) influx and dopamine receptor stimulation. Originator supplied keywords include: Operant

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conditioning, Neuronal conditioning, Reward, Adaptive networks, Positive reinforcement, Learning.

DESCRIPTORS: (U) *CONDITIONING(LEARNING), *BRAIN *INTELLIGENCE, *NERVE CELLS, *NEUROCHEMICAL TRANSMISSION, ADAPTATION(PHYSIOLOGY), HIPPOCAMPUS, NEURAL NETS, PHOSPHORYLATION, ACETYLCHOLINE, DOPAMINE, COCAINE, DOPAMINE, SENSE ORGANS, BIOCHEMISTRY, FIRING RATES

IDENTIFIERS: (U) Brain cells, Operant conditioning, Neuronal conditioning, Dopamine receptors, Pyramidal cells, Reward, Reinforcement(Learning), PE61102F, WUAFOSR2312A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A151 070 12/1

AD-A151 069 20/1

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

FLORIDA UNIV GAINESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Convolution of the IFRA (Increasing Failure Rate Average) Scaled-Mins Class.

(U) Study of 1/f Noise in Solids.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Final rept. 16 Jun 83-31 Jul 84.

JAN 85 10P

OCT 84 78P

PERSONAL AUTHORS: El-Newehi, E.; Savits, T. H.;

PERSONAL AUTHORS: Van Vliet, C. M.; Bosman, G.;

CONTRACT NO. N00014-84-K-0084, AFOSR-84-0113

CONTRACT NO. AFOSR-82-0226

MONITOR: AFOSR
TR-85-0109

PROJECT NO. 2305

TASK NO. C1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Illinois Univ. at Chicago Circle. Dept. of Mathematics, Statistics and Computer Science under Grant AFOSR-80-0170.

MONITOR: AFOSR
TR-85-0121

UNCLASSIFIED REPORT

ABSTRACT: (U) In recent years various multivariate extensions of the univariate classes of life distributions that are important in reliability theory have been proposed. A survey of many of these classes may be found in Block and Savits (1981). In this paper we focus on one particular extension of the IFRA (Increasing Failure Rate Average) class due to Esary and Marshall (1979). Supplied-keywords include: Increasing failure rate average; characterizations; convolution, and Equations.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *CONVOLUTION, EQUATIONS, FAILURE, RATES, RELIABILITY, THEORY

IDENTIFIERS: (U) IFRA(Increasing Failure Rate Average)

ABSTRACT: (U) In the introduction an overview is given of the status of 1/f noise at the end of the contract period. We indicate that the 1/f noise observed in our laboratory, as well as in other places, quite often yields Hooge parameters of order 10⁻⁵ to 10⁻⁸, i.e., two to five orders less than a decade ago. Much of this noise can be seen as quantum 1/f noise which is the limiting noise that can be observed. Our measurements on submicron gallium arsenide devices, microwave narrow base transistors, and gold films at below the Debye temperature, and in radioactive decay and partition 1/f noise, all point in this direction. Over and above this limiting noise, additional 1/f-like noise is often observed. For this, the standard physical mechanisms, involving activation energy processes or tunneling processes, usually apply. More research on this larger 1/f noise is still needed. In the section on experimental work, we discuss the status of 1/f noise in transistors and in gold films. Also, we discuss the high frequency intervalley scattering noise in gallium arsenide devices. Good agreement with Monte Carlo simulations is obtained. New results are also presented for noise in radioactive decay. Both 1/f noise and Lorentzian flicker noise are observed. The flicker floor is lower for lower alpha-particle energies, in agreement with the quantum theory of 1/f noise. In the theory section of quantum 1/f noise is applied to electron phonon scattering. Explicit results for the resulting mobility-fluctuation noise and

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for the Hooge parameters involved are obtained. Numerical computations are in progress. keywords include: 1/f noise, metal films, transistors, radioactive decay, intervalley noise, GaAs.

DESCRIPTORS: (U) *NOISE, SEMICONDUCTOR DEVICES, NOISE(ELECTRICAL AND ELECTROMAGNETIC), ACTIVATION ENERGY, ELECTRON SCATTERING, PHONONS, GALLIUM ARSENIDES, HIGH FREQUENCY, METAL FILMS, MONTE CARLO METHOD, GOLD, MICROWAVE EQUIPMENT, TRANSISTORS, QUANTUM THEORY, SCATTERING, TUNNELING, RADIOACTIVE DECAY, SOLIDS

IDENTIFIERS: (U) PE81102F, WUAFOSR2305C1

TEXAS UNIV AT AUSTIN GEOTECHNICAL ENGINEERING CENTER

(U) Effects of Structural and Stress Anisotropy on Velocity of Low-Amplitude Compression Waves Propagating Along Principal Stress Directions in Dry Sand.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-15 Feb 84.

JUN 84 91P

PERSONAL AUTHORS: Lee, S. H. H. ; Chu, H. Y. F. ; Stokoe, K. H. , II ;

CONTRACT NO. AFOSR-83-0062

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0089

UNCLASSIFIED REPORT

ABSTRACT: (U) A 7-ft cubical sample of dry sand was tested using the triaxial device constructed by Kopperman et al (1982) and Knox et al (1982). The sand was the same as that used by Kopperman and Knox. A new raining device was fabricated and used to construct this sand sample which resulted in a more uniform sample than prepared earlier. Improvements were also made to the excitation ports in order to have better control. Extensive tests were performed under the following different stress states: isotropic, biaxial and triaxial. In each case, velocities of p-waves propagating along all principal stress directions were measured. Results from these tests lead to the following conclusions: (1) the effect of stress history on p-wave velocity is negligible (2) the sample can be treated as a cross-anisotropic material under isotropic confinement due to structural anisotropy, (3) complete anisotropy resulted by the coupling of stress anisotropy and structural anisotropy, and (4) p-wave velocity depends on the principal effective stress in the direction of propagation with principal stresses perpendicular to the direction of propagation having a negligible effect on velocity.

DESCRIPTORS: (U) *WAVE PROPAGATION, *SHOCK WAVES, *SOIL

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IDENTIFIERS: (U) PE61102F, WJAFOSR2312A1

INTEGRATED SYSTEMS INC PALO ALTO CA

(U) Adaptive Techniques for Control of Large Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Jun 83-31 May 84,

DEC 84 141P

PERSONAL AUTHORS: Kosut, R. L.; Lyons, M. G.;

CONTRACT NO. F49620-83-C-0107

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR-85-0078

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is a collection of published papers reporting on research supported by AFOSR. These papers deal primarily with theoretical aspects of adaptive control of systems which cannot be precisely modeled, e.g., unmodeled dynamics and disturbances. These latter characteristics are fundamental issues in adaptive (and nonadaptive) control design for large space structures (LSS). Some of the general topics covered include: LSS modeling and model error, decentralized control, robust adaptive control, global stability, local stability, and persistent excitation. Keywords include: Large space structures; adaptive control; robust control; equations.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *SPACECRAFT, *CONTROL THEORY, *STABILIZATION SYSTEMS, DYNAMICS, ERRORS, DECENTRALIZATION, STABILITY, PERTURBATIONS, CO.,ROL SYSTEMS, EXCITATION, MATHEMATICAL MODELS, EQUATIONS

IDENTIFIERS: (U) Large space structures, Robust control, PE61102F, WJAFOSR2307B1

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DESCRIPTORS: (U) *CARCINOGENS, *CARCINOGENESIS,
*NEOPLASMS, CELLS(BIOLOGY), CULTURES(BIOLOGY), ESTERS,
INHIBITION, HUMANS, METABOLISM, TIME, TRANSFORMATIONS

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) Biological Investigations of Adaptive Networks.
Neuronal Control of Conditioned Responding.

IDENTIFIERS: (U) PE61102F, WJAFOSR2312A5 LPM-OSURF-
762404/713292

DESCRIPTIVE NOTE: Annual technical rept. 31 May 83-30 Apr
84.

MAY 84 12P

PERSONAL AUTHORS: Moore, J. W.

CONTRACT NO. AFOSR-83-0215

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-85-0071

UNCLASSIFIED REPORT

ABSTRACT: (U) Neurobiological investigations of adaptive neural networks were initiated using the classically conditioned nictitating membrane (NM CR) of rabbit. One experimental approach involved recording from single brain neurons from awake, behaving animals for the purpose of determining the loci and characteristics of neurons with activity correlated with the NR CR or its inhibition. A second approach involved in the use of discrete brain lesions that selectively eliminate the NM CR while at the same time sparing the basic reflex pathway. A third approach employed fiber-tracing anatomical techniques designed to clarify the interconnectivity among brain regions essential for the NM CR. These regions include discrete portions of the cerebellum and brain stem. Information from physiological studies have been incorporated into mathematical models of learning used by adaptive network researchers, and anatomical findings have guided the development of related neuronal models.

DESCRIPTORS: (U) *CONDITIONED RESPONSE, *NEURAL NETS,
*NERVE CELLS, ADAPTATION, CONDITIONING(LEARNING),
MEMBRANES(BIOLOGY), ELECTROENCEPHALOGRAPHY, SPINAL CORD,
REFLEXES, BRAIN, CEREBELLUM, LESIONS, MATHEMATICAL MODELS,
RABBITS

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AD-A150 962 6/20 6/16

GRIDS(COORDINATES), THREE DIMENSIONAL, STRESS ANALYSIS, NUMERICAL METHODS AND PROCEDURES, AXISYMMETRIC, DIGITAL COMPUTERS, FOUNDATIONS(STRUCTURES), ELASTIC PROPERTIES, FINITE ELEMENT ANALYSIS

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Chemical Carcinogen-Induced Changes in tRNA Metabolism in Human Cells.

IDENTIFIERS: (U) SLAB model, ILLI-Slab computer program, FIDES computer program, CFES computer program

DESCRIPTIVE NOTE: Final rept. 30 Sep 80-30 Sep 84,

NOV 84 143P

PERSONAL AUTHORS: Trewyn, R. W. ;

CONTRACT NO. AFOSR-80-0283

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-85-0098

UNCLASSIFIED REPORT

ABSTRACT: (U) It was proposed that changes in tRNA metabolism are required for cells to progress through the stages of carcinogenesis, and a comprehensive hypothesis was formulated to describe tRNA-mediated endogenous promotion of carcinogenesis. This hypothesis offers a viable explanation for the lengthy time frame observed between carcinogen exposure and neoplastic transformation. A role was defined for 7-methylguanine as an endogenous promoting agent, whereby this natural RNA catabolite induces queuine hypomodification in the tRNA anticodon by inhibiting the queuine insertion enzyme tRNA-guanine ribosyltransferase. Subsequently, 7-methylguanine induces neoplastic transformation. A cell culture system was developed which allows the study of tumor promoter-induced mimicry of transformation with normal human cells, and using this system, phorbol ester tumor promoters were also demonstrated to induce queuine hypomodification of tRNA. However, in this case, the hypomodification occurred due to a specific phorbol ester inhibition of queuine transport into the cells. Most importantly, overcoming the tumor promoter-induced hypomodification of tRNA by supplying the cells with excess queuine, blocked the expression of a transformed phenotype by the human cells. Therefore, queuine may be an anti-promoting compound, and a role for queuine hypomodification in the expression (promotion) of carcinogenesis appears likely.

AD-A150 965

AD-A150 962

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 986 20/12 20/8

AD-A150 985 13/2 9/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

ILLINOIS UNIV AT URBANA DEPT OF CIVIL ENGINEERING

(U) Infrared Nonlinear Processes in Semiconductors.

(U) Analysis of Slabs-on-Grade for a Variety of Loading and Support Conditions.

DESCRIPTIVE NOTE: Annual technical rept. 1 Dec 83-30 Nov 84.

DESCRIPTIVE NOTE: Annual rept. 1 May 83-30 Sep 84.

JAN 85 8P

DEC 84 585P

PERSONAL AUTHORS: Wolff, P. A.; Aggarwal, R. L.; Jagannath, C.; Larsen, D. M.; Yuen, S. Y.

PERSONAL AUTHORS: Ioannides, A. M.; Donnelly, J.; Thompson, M. R.; Barenberg, E. J.

CONTRACT NO. F49820-84-C-0010

CONTRACT NO. AFOSR-82-0143

PROJECT NO. 2306

PROJECT NO. 2307

TASK NO. C2

TASK NO. C1

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0120

TR-85-0083

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Intervalence band relaxation times have been measured, in the picosecond range, in p-type GaAs and Ge. These measured times are in agreement with those calculated for optics phonon mediated processes. An anticrossing, predicted by People and Wolff, has been observed between As donor levels of opposite spin in Ge. A theory has been developed, which, with no adjustable parameters, provides good agreement with experiment. Originator-supplied keywords include: Infrared, Nonlinear optics, and Semiconductors.

ABSTRACT: (U) This study is concerned with analytical and numerical procedures applied to slab-on-grade pavements, treated as plates on elastic foundation, with particular emphasis on the possibilities offered by the automated digital computer. In the first part of the report, analyses employing the dense liquid foundation are examined. This includes an exhaustive reexamination of Westergaard's work, which established conclusively the correct form of the Westergaard equations and pointed out that the New edge stress formula should be used. Closed-form solutions for a plate on a dense liquid or an elastic solid foundation are assembled in a computerized compendium called WESTER. The second part of the study focuses on elastic solid analyses of the same problem. Pickett's Chart for edge stress is recalculated using computerized numerical integration, and the results is incorporated in computer program H5IES. Three additional computer codes are developed: 1) A method using the concept of concordant deflections for axisymmetric plates (program CFES); 2) A finite difference approach for rectangular plates (program FIDIES); and 3) A finite element solution for rectangular plates (incorporated into program ILLI-SLAB).

DESCRIPTORS: (U) *SEMICONDUCTORS, *INFRARED RADIATION, ELECTROOPTICS, GALLIUM ARSENIDES, GERMANIUM, NONLINEAR SYSTEMS, PHONONS, BIBLIOGRAPHIES

IDENTIFIERS: (U) PEB1102F, WUAFOSR2306C2

DESCRIPTORS: (U) *PAVEMENTS, *MODELS, *COMPUTER PROGRAMS, RIGIDITY, NONLINEAR ANALYSIS, INPUT OUTPUT PROCESSING.

AD-A150 986

AD-A150 985

UNCLASSIFIED

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 976 CONTINUED

AD-A150 975 7/3 11/10

DESCRIPTORS: (U) *KETONES, *PHENYL RADICALS, *ALKYL RADICALS, *PHOTOLYSIS, ADSORPTION, ALUMINUM COMPOUNDS, CRYSTALS, SILICATES, MOLECULES, CONFORMITY, MOLECULAR SIEVES, REPRINTS

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Preparation of 1-Silyl- and 1,3-Disilyl-Adamantanes, 84 8P

IDENTIFIERS: (U) Zeolite, PE61102F, WUAFOSR230382

PERSONAL AUTHORS: Pat, Y. M.; Wanek, E.; Weber, W. P.;

CONTRACT NO. AFOSR-82-0333

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0147

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v270 p271-275 1984.

ABSTRACT: (U) 1-Dimethylsilyl- and 1,3-bis(dimethylsilyl) adamantane have been prepared in low yield by Wurtz reaction of dimethylchlorosilane with 1-chloroadamantane or 1,3-dichloroadamantane, respectively. On the other hand, reaction of phenyl-dimethylsilyllithium with 1-bromoadamantane or 1,3-dibromoadamantane gives essentially quantitative yields of 1-phenyldimethylsilyladamantane or 1,3-bis-(phenyldimethylsilyl)adamantane, respectively. Originator keywords included: Silyladamantane derivatives.

DESCRIPTORS: (U) *ADAMANTANES, *SYNTHESIS(CHEMISTRY), SILICON, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR230382

AD-A150 976

AD-A150 975

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 980 7/4 8/1

AD-A150 978 7/5 7/3

COLORADO UNIV AT BOULDER

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) International Conference on Coordination Chemistry (23rd) Held at Boulder, Colorado on 29 July-3 August, 1984.

(U) Photochemistry of Phenyl Alkyl Ketones Adsorbed on Zeolite Molecular Sieves. Observation of Pronounced Effects on Type I/Type II Photochemistry.

DESCRIPTIVE NOTE: Final rept. 1 May 84-30 Apr 85.

84 5P

SEP 84 8P

PERSONAL AUTHORS: Turro, N. J.; Wan, P. ;

PERSONAL AUTHORS: Sievers, R. ;

CONTRACT NO. AFOSR-81-0013

CONTRACT NO. AFOSR-84-0094

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. 82

TASK NO. 82

MONITOR: AFOSR

TR-85-0157

MONITOR: AFOSR

TR-85-0148

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron Letters, v25 n34 p3655-3658 1984.

ABSTRACT: (U) The International Conference on Coordination Chemistry was held in the United States. It took place at the University of Colorado, Boulder, on July 29 through August 3, 1984. The number of active participants was 784 and the number of accompanying guests was 145. Thirty-seven countries were represented. Sixty-five percent of the attendees were from the United States, and the remaining thirty-five percent were from other countries. Those areas where the largest interest and most papers were presented are in the areas as follows: (1) Energetics and Dynamics-Kinetics and Mechanisms; (2) Energetics and Dynamics-Electrochemistry/Thermodynamics; (3) Bioinorganic-Metalloenzymes; (4) Synthesis-Special Ligands; (5) Techniques and Applications-Electronic Structure. Originator supplied key words include: International conference, Coordination chemistry, Energetics and dynamics, Bioinorganic, Synthesis, Catalysis.

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *BIOCHEMISTRY, *THERMOCHEMISTRY, THERMODYNAMICS, ELECTRONIC STATES, ENZYMES, LIGANDS, CATALYSIS, SYMPOSIA

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303B2

AD-A150 980

AD-A150 978

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ABSTRACT: (U) The photolysis of phenyl alkyl ketones adsorbed on a number of commonly available zeolites(molecular sieves) can result in dramatic changes in Type I/Type II photochemistry. The photochemistry of ketones in ordered environments is topic of current interest. Environmental effects can have important influence on the conformational flexibility of organic molecules, which in turn can affect the outcome of photochemical reactions. Two recent reports on the Norrish Type II reaction in ordered media prompts us to report our initial studies of the photochemistry of a number of phenyl alkyl ketones adsorbed in zeolites. Zeolites are crystalline aluminosilicates of usually well-defined structure. Within the zeolite framework are a system of channels and cavities of varying dimensions(2 - 13A), some of which are capable of adsorption of large organic molecules (e.g., substituted benzenes). Thus the possibility that the internal spaces (or void volumes) of zeolites can exert topological control on organic photochemical reactions warrants investigation, since it is well-known that zeolites display shape-selective catalytic and adsorptive properties in important industrial chemical processes. Originator supplied keywords include: phenyl alkyl ketones, zeolite molecular sieves, photochemistry, silicalite, conformation.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A151 002 CONTINUED

AD-A150 989 20/11

IDENTIFIERS: (U) JSEP(Joint Services Electronics Program)
. Information electronics, WUAFOSR2305A9, PEG1102F

UTAH UNIV SALT LAKE CITY COLL OF ENGINEERING

(U) On the Corner Singularity of a 3-D Griffith Crack.

DESCRIPTIVE NOTE: Final rept. 15 Sep 82-14 Mar 84.

MAR 84 34P

PERSONAL AUTHORS: Folias, E. S. ; Wang, J. J. ;

REPORT NO. UTEC-84-027

CONTRACT NO. AFOSR-82-0324

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR
TR-85-0136

UNCLASSIFIED REPORT

ABSTRACT: (U) This report discusses some further developments of an analytical solution to the 3-D Griffith crack problem. The analysis shows the stresses at the corner points to be singular of the order $(1/2 + 2n)$. Moreover, the stress boundary conditions at the plate faces are shown to be proportional to $(h-z)$, at the upper face, and to $(h+z)$, at the lower face. Originator-supplied keywords included: Three-dimensional Griffith crack, Linear elastic fracture mechanics, Three-dimensional stress singularities.

DESCRIPTORS: (U) *CRACKS, *THREE DIMENSIONAL, SOLUTIONS(GENERAL), ELASTIC PROPERTIES, FRACTURE(MECHANICS), LINEARITY, BOUNDARIES, STRESSES, PROBLEM SOLVING

IDENTIFIERS: (U) PEG1102F, WUAFOSR230782

AD-A151 002

AD-A150 989

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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AD-A151 002 9/3

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

POLYTECHNIC INST OF NEW YORK BROOKLYN MICROWAVE RESEARCH INST

(U) Studies on Radiative Collisional and Ultraviolet Lasers.

(U) Basic Research in Electronics (JSEP).

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 83-30 Sep 84.

DESCRIPTIVE NOTE: Annual rept. 1 Apr-31 Dec 84,

DEC 84 43P

DEC 84 231P

PERSONAL AUTHORS: Harris, S. E. ; Young, J. F. ;

PERSONAL AUTHORS: Oliner, A. A. ;

REPORT NO. GL-3812

REPORT NO. POLY-MRI-1432-83

CONTRACT NO. F49620-83-C-0018

CONTRACT NO. F49620-82-C-0084

PROJECT NO. 2301

PROJECT NO. 2305

TASK NO. A1

TASK NO. A9

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0134

TR-85-0122

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This program has supported theoretical and experimental studies in several areas of research on XUV physics and laser technology. The highlight of our work during the previous year has been the definition and experimental confirmation of a new class of levels which we term as quasi-metastable. These levels allow significant simplification in our store and transfer methods and, of more importance, will, in certain cases, allow lasing in the extreme ultraviolet without the need for a transfer laser. Our work on these levels is summarized in Appendices A and B of this report. Section 2 of this report summarizes the status of our other projects. Section 3 lists the publications which have resulted under this contract, and Section 4 lists personnel who are presently supported by this contract. Originator supplied keywords include: XUV physics, Laser technology.

DESCRIPTORS: (U) *ULTRAVIOLET LASERS, COLLISIONS, FAR ULTRAVIOLET RADIATION, PHYSICS, METASTABLE STATE, RADIATIVE TRANSFER

DESCRIPTORS: (U) *ELECTRONICS, *REPORTS, ELECTROMAGNETISM, SOLID STATE ELECTRONICS, MICROWAVES, MILLIMETER WAVES, DIELECTRIC WAVEGUIDES, OPTICS, X RAYS, SURFACE ACOUSTIC WAVES, IMAGE RESTORATION, AIR FORCE RESEARCH

IDENTIFIERS: (U) WUAFOSR2301A1, PEB1102F

AD-A151 004

AD-A151 002

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A151 018 CONTINUED

BERNARD M BARUCH COLL NEW YORK PSYCHOPHYSIOLOGY LAB

(U) Psychophysiological Studies I. Performance and Physiological Response in Learning, Short-Term Memory and Discrimination Tasks.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Oct 83-30 Sep 84,

NOV 84 91P

PERSONAL AUTHORS: Andreassi, J. L. ; Juszcak, N. M. ;

CONTRACT NO. AFOSR-83-0304

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0070

UNCLASSIFIED REPORT

ABSTRACT: (U) The report details the background, findings and conclusions of three studies completed in the Psychophysiology Laboratory of Baruch College, City University of New York, over the past twelve months. The first experiment was concerned with the effects of varied frequency of light stimulation upon verbal learning and a number of physiological responses, including: heart rate (HR), electromyogram (EMG), pulse wave velocity (PWV) and skin temperature (ST). The main findings were that HR was sensitive to task difficulty, while EMG was affected by frequency of light stimulation. Another finding was that lower baseline HR was related to better learning performance. The second study examined the effects of intensity of light stimulation on performance in a short term memory task (Sternberg paradigm) and a variety of physiological measures, including the event-related brain potential (ERP), HR, EMG, PWV, and ST. The major findings were that the endogenous component of the ERP (the P3 response) was delayed in latency with increased memory set size under the condition of no light stimulation. In the third study, we focused upon an examination of possible differences between the left and right hemispheres of the brain in processing verbal (words) versus spatial (areal size estimation) materials. Originator supplied keywords include: Event related potentials, Heart rate (HR), Electromyogram (EMG), Skin

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temperature (ST), Pulse wave velocity (PWV), Verbal learning, Sternberg paradigm, Hemispheric asymmetries, Light stimulation, and Areal discrimination.

DESCRIPTORS: (U) *PERFORMANCE(HUMAN), *DISCRIMINATION, *LEARNING, *PSYCHOPHYSIOLOGY, *MEMORY(PSYCHOLOGY), STIMULATION(PHYSIOLOGY), INTENSITY, ELECTROPHYSIOLOGY, BRAIN, ELECTROMYOGRAPHY, HEART RATE, LIGHT, HEMISPHERES, PULSES, VELOCITY, WAVES, BODY TEMPERATURE, RESPONSE(BIOLOGY), VERBAL BEHAVIOR

IDENTIFIERS: (U) Event related potentials, PE81102F, WJAFDSR2313A4

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A151 031 11/6 7/4

AD-A151 031 CONTINUED

NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE
AND ENGINEERING

metastable cubic phases. Originator-supplied keywords
include: Ostwald ripening (coarsening); aluminum-iron
cerium alloy; aluminum-zirconium-vanadium alloy; iron-
molybdenum-vanadium alloy, and aluminum-molybdenum-
vanadium alloy.

(U) Synthesis and Properties of Elevated Temperature P/M
Aluminum Alloys.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 83-30 Sep
84.

DESCRIPTORS: (U) *ALUMINUM ALLOYS. *COMPOSITION(PROPERTY)
*PARTICLES. HEAT TREATMENT. MICROSTRUCTURE. IRON ALLOYS.
CERIUM ALLOYS. VANADIUM ALLOYS. ZIRCONIUM ALLOYS.
MOLYBDENUM ALLOYS. CREEP. LOW TEMPERATURE. DEFORMATION.
DISPERSIONS. SPECTROSCOPY. FATIGUE(MECHANICS).
AGING(MATERIALS). HIGH TEMPERATURE

NOV 84 97P

PERSONAL AUTHORS: Fine, M. E. ; Weertman, J. R. ;

CONTRACT NO. AFOSR-82-0005

IDENTIFIERS: (U) Coarsening, Ostwald ripening(Coarsening)
PE61102F, PE612308, WUAFOSR2308A1

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0139

UNCLASSIFIED REPORT

ABSTRACT: (U) The dispersed phases in the Al-8Fe, Al-10Fe-1.5Mo-1V, Al-8.8Fe-3.7Ce and Al-8.9Fe-6.9Ce RSP P/M alloys have been examined for composition and coarsening rate. Additionally, effects of prior heat treatment and deformation on particle coarsening have been studied. Energy dispersive spectroscopy on extracted particles from the Al-8Fe and Al-10Fe-1.5Mo-1V alloys in the as-received condition as well as after aging at 318 C indicated that the particles have compositions close to Al8Fe. In these two alloys, aging 240 hours at 425 C gives particles close to Al13Fe4 in composition. In Al-Fe-Ce alloys aged at 425 C, two kinds of particles are present with composition close to Al13Fe4 and Al10Fe2Ce. Some Al8Fe is seen in these alloys in the as-received condition and also after aging at 318 C. Overall coarsening rates of the dispersed phases indicate that at 375 and 425 C the Al-Fe-Mo-V alloy coarsens more slowly than the other three alloys. Creep deformation of the Al-8.8Fe-3.7Ce alloy enhances particle coarsening rates while no such effect is noted after fatigue deformation. A high temperature age preceding a low temperature age gives a stable microstructure at the lower temperature. The improved lattice matching previously observed in the equilibrium, tetragonal Al3(V0.875Zr0.125) over the unalloyed Al3Zr phase was also found in the respective

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AD-A151 032 CONTINUED

TEXAS TECH UNIV LUBBOCK OPTICAL SYSTEMS LAB
(U) Space-Variant Optical Systems. Incoherent optical processors, Reference beams, Time
integrating detectors, Computer generated holograms,
PEB1102F, WUAFOSR2305B1

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 79-30 Sep
84.

NOV 84 23P

PERSONAL AUTHORS: Walkup, J. F.; Krille, T. F. ;

CONTRACT NO. AFOSR-79-0078

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-85-0090

UNCLASSIFIED REPORT

ABSTRACT: (U) Both experimental and analytical investigations of 1-D and 2-D, coherent and incoherent space-variant optical processors have been conducted. The investigations included 1) continuation of a previous work on multiplexed holograms with phase-coded reference beams, 2) construction of a computer-controlled laser plotter, 3) design of incoherent processors which use color as an extra parameter, 4) applications of acousto-optical modulators and time-integrating detectors to space-variant processors, 5) initiation of piecewise-isoplanatic model investigations, and 6) initiation of studies on the use of space-variant systems for binary numerical optical computing. Keywords include: Space-Variant Optical Processing, Multiplex Holography, Numerical Optical Processing, Hologram Optical Elements, Computer-Generated Holograms, Incoherent Optical Processing.

DESCRIPTORS: (U) *IMAGE PROCESSING, *BINARY PROCESSORS, *HOLOGRAMS, *OPTICAL PROCESSING, ACOUSTOOPTICS, MODULATORS, COMPUTER APPLICATIONS, CONTROL, LASERS, PLOTTERS, OPTICAL EQUIPMENT COMPONENTS, HOLOGRAPHY, MULTIPLEXING, INCOHERENCE, NUMERICAL ANALYSIS, LASER BEAMS, COLORS, PHASE, CODING, INTEGRATORS, TIME, ONE DIMENSIONAL, TWO DIMENSIONAL

IDENTIFIERS: (U) *Space variant optical processors,

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DTIC REPORT BIBLIOGRAPHY

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AD-A151 033 12/1 5/1

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN
OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

(U) Ergodicity and Steady-State-Equilibrium Conditions for
Markov Chains.

(U) Properties of Systems Which Lead to Efficient
Computation of Reliability.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Technical rept.,

JAN 85 19P

AUG 84 9P

PERSONAL AUTHORS: Georgiadis, L.; Papantoni-Kazakos, P.;

PERSONAL AUTHORS: Ball, M. O.; Provan, J. S.;

REPORT NO. UCT/DECS/TR-85-1

REPORT NO. UNC/ORSR/TR-84/18

CONTRACT NO. AFOSR-83-0229

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0108

MONITOR: AFOSR

TR-85-0105

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Generalized stationary Markov chains with
denumerable state space are considered. For irreducible
and aperiodic such chains, some sufficient conditions for
ergodicity and steady state equilibrium are developed.
The conditions for ergodicity are generalizations of
previously proposed such conditions, and they are more
tractable for certain applications. (Author)

Availability: Document partially illegible.

ABSTRACT: (U) One of the most widely used approaches to
computing systems reliability is to represent the system
structure in terms of a Boolean sum of all minpaths. This
expression is then transformed into a sum of disjoint
terms. The probability of each term is then summed to
obtain the reliability of the system. A key question with
respect to the difficulty of this process relates to the
ability to transform the initial sum into a sum of
disjoint products. In this paper, the authors show that
for the class of shellaible systems, there always exists a
disjoint product expression with a number of terms equal
to the number of minpaths. The authors provide several
examples of shellaible systems for which an expression can
be efficiently found.

DESCRIPTORS: (U) *CHAINS, *MARKOV PROCESSES, ERGODIC
PROCESSES, STATIONARY, STEADY STATE

IDENTIFIERS: (U) WJAFOSR2304A5, PEB1102F

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES,
*COMPUTATIONS, *SYSTEMS ANALYSIS, *RELIABILITY, BOOLEAN
ALGEBRA, APPROXIMATION(MATHEMATICS), PROBABILITY,
COHERENCE, LINEAR SYSTEMS, ALGORITHMS

IDENTIFIERS: (U) *Shellaible systems, *Shellaibility,
Minpaths, PEB1102F, WJAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A151 047 CONTINUED

AD-A151 045 21/2 20/4

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F

SHEFFIELD UNIV (ENGLAND) DEPT OF CHEMICAL ENGINEERING
AND FUEL TECHNOLOGY

(U) Fundamental Study of Three Dimensional Two Phase Flow
in Combustion Systems.

DESCRIPTIVE NOTE: Final rept. 15 May 82-31 May 83.

JUN 83 81P

PERSONAL AUTHORS: Swithenbank, J. ; Ewan, B. C. R. ; Boysan, F.
; Ayers, W. H. ;

CONTRACT NO. AFOSR-82-0272

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0102

UNCLASSIFIED REPORT

ABSTRACT: (U) Details are presented on the latest developments in the mathematical modelling of turbulence with particular reference to the pressure strain transport term. Comparisons are made of the radial variation of normal and shear stress with published data for a round jet and for decay of turbulence for selected flow fields. Work is also reported on the measurement and calculation of flow fields inside a dump combustor using swirl and baffle stabilisation. The value of the different turbulence approximations in predicting the flow are discussed. Originator supplied keywords include: Combustion modelling, Turbulence modelling, Dump combustor, Swirling flow.

DESCRIPTORS: (U) *THREE DIMENSIONAL FLOW, *TH. PHASE FLOW, *TURBULENT FLOW, *COMBUSTORS, *COMBUSTION, SHEAR STRESSES, JET FLOW, BAFFLES, COMPUTATIONS, FLOW FIELDS, DECAY, TURBULENCE, MATHEMATICAL MODELS, APPROXIMATION(MATHEMATICS), PRESSURE, STRAIN(MECHANICS), TRANSPORT

IDENTIFIERS: (U) Dump combustors, Swirling flow.
WUAFOSR2308A2, PE61102F

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AD-A151 045

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A151 059 CONTINUED

AD-A151 047 12/1

MECHANICS, *SAND, *STRESSES, VELOCITY, STRESS
CONCENTRATION, STRUCTURAL MECHANICS, ANISOTROPY, DRY
MATERIALS, AMPLITUDE, COMPRESSION, ORIENTATION(DIRECTION)

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Practical Methods for the Compensation and Control of
Multivariable Systems.

IDENTIFIERS: (U) WUAFOSR2307C1, PE61102F

DESCRIPTIVE NOTE: Final rept. 15 Sep 83-14 Sep 84,

JAN 85 8P

PERSONAL AUTHORS: Wolovich, W. A. ; Cometta, C. ;

CONTRACT NO. AFOSR-83-0359

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0106

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by the grant four papers were written. Titles include, Parameterization issues in multivariable adaptive control. A computational technique for inverse kinematics, and Deadbeat control using periodic feedback. A unified treatment of direct and indirect strategies for parameterizing multivariable adaptive controllers was given. By considering unknown, but linear and time invariant systems in a deterministic setting, virtually all commonly employed adaptive control strategies were derived using pole placement notions. A new numerical solution to the general version of the inverse kinematic problem in robotics was obtained. Research within the Laboratory for Engineering Man/Machine Systems at Brown University focussed on the development of a general purpose 68000 based microprocessor controller which could be employed in a variety of control environments. At present, a preliminary version of such a unit has been constructed and is being used to control a single axis of an IBM RS11 Cartesian robot. (Author)

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS,
*MULTIVARIATE ANALYSIS, MICROPROCESSORS, COMPENSATION,
SETTING(ADJUSTING), KINEMATICS, SOLUTIONS(GENERAL),
COMPUTATIONS, INVARIANCE, LINEAR SYSTEMS, FEEDBACK,
ROBOTICS

AD-A151 059

AD-A151 047

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 946 12/1

AD-A150 946 CONTINUED

SOUTH CAROLINA UNIV COLUMBIA DEPT OF MATHEMATICS AND
STATISTICS

functions, PE61102F, WUAFDSR2304A5

(U) Nonparametric Estimation of Density and Hazard Rate
Functions when Samples are Censored.

DESCRIPTIVE NOTE: Technical rept..

JAN 85 33P

PERSONAL AUTHORS: Padgett, W. J. ;

REPORT NO. TR-103

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0107

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this article is to present the different types of nonparametric density estimates that have been proposed for the situation that the sample data are censored or incomplete. This type of data arises in many life testing situations and is common in survival analysis problems. Many of the methods of nonparametric density and hazard rate estimation from right-censored observations are discussed. These include histogram and kernel-type procedures, likelihood methods, Fourier series methods, and Bayesian nonparametric approaches. Examples of kernel density estimates are given for mechanical switch life data where data-based choices of the bandwidth values are used. Originator-supplied keywords included: Nonparametric density estimation; Random censorship; Failure rate; Kernel density estimator; Likelihood methods.

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, MAXIMUM LIKELIHOOD ESTIMATION, EXPERIMENTAL DATA, HISTOGRAMS, FOURIER SERIES, LIFE TESTS, CENSORSHIP, FAILURE, HAZARDS, KERNEL FUNCTIONS, DENSITY, ESTIMATES

IDENTIFIERS: (U) *Nonparametric density estimation, Random censorship, Kernel density estimator, Hazard rate

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OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 945

4/1

UTAH STATE UNIV LOGAN CENTER FOR ATMOSPHERIC AND SPACE SCIENCES

(U) High Time-Resolution Studies of the Auroral Ionosphere.

DESCRIPTIVE NOTE: Final rept. 1 Feb 82-31 May 84.

SEP 84

9P

PERSONAL AUTHORS: Foster, J. C. ;

CONTRACT NO. AFOSR-82-0093

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR

TR-85-0149

UNCLASSIFIED REPORT

ABSTRACT: (U) Monostatic radar experimental technique and analysis software were developed to permit spatial mapping of high-latitude ionospheric parameters across a 1000 km region. Details of the midnight and noon sectors were examined. MITHRAS electric field analysis supported the development of predictive ionospheric models and addressed global imaging of the convection electric field.

DESCRIPTORS: (U) *IONOSPHERE, TIME, HIGH RESOLUTION, AURORAE, IONOSPHERIC MODELS, MAPPING, SPATIAL DISTRIBUTION, CONVECTION, ELECTRIC FIELDS, MONOSTATIC RADAR, COMPUTER PROGRAMS

IDENTIFIERS: (U) Mithras electric field analysis, PEB1102F, WUAFOSR2310A2

AD-A150 944 20/9 20/3 14/2

AMAF INDUSTRIES INC COLUMBIA MD

(U) Experimental Investigation of Neutral Plasma Beam Propagation Across a Magnetic Field.

DESCRIPTIVE NOTE: Final rept.,

SEP 84 79P

PERSONAL AUTHORS: Spight, C. ; Miller, R. W. ;

REPORT NO. 8409-X1300-200

CONTRACT NO. F49620-83-C-0091

MONITOR: AFOSR
TR-85-0097

UNCLASSIFIED REPORT

ABSTRACT: (U) The conversion, described herein, of a pre-existing Hypervelocity Plasma Generator Facility to operate in a regime of importance to particle beam research has been completed. The facility is now capable of producing a plasma flow-magnetic field environment that in a scaled manner simulates the exoatmospheric propagation of a plasmoid across the geomagnetic field. A full set of flow and field diagnostics have been implemented and calibrated. It includes magnetic field probes for the slowly varying transverse background and the fast varying motionally induced fields, a laser schlieren system for monitoring density gradient structure of the beam and time-of-flight fast photodiode probes for beam velocity measurements. Port access is available for monitoring directly electrostatic or electromagnetic fields associated with beam propagation. In tandem with experimental activity a theoretical analysis effort has been initiated, an interaction with theoreticians at Los Alamos Scientific Laboratory, which intends a significant contribution to the stability analysis of a bounded plasma beam which can exhibit polarization and/or diamagnetic effects. No satisfactory theory or numerical simulations are currently available for that intrinsically three-dimensional dynamics. Originator-supplied keywords include: Diagnostic; Current; Magnetic field; Plasma(Physics); Plasmoid. (Author).

DESCRIPTORS: (U) *PLASMA GENERATORS, *ELECTROMAGNETIC WAVE PROPAGATION, *PLASMAS(PHYSICS), *MAGNETIC FIELDS.

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AD-A150 939 17/2.1 20/14

POLARIZATION, FLOW FIELDS, PROBES(ELECTROMAGNETIC), SIMULATION, BEAMS(RADIATION), ELECTROMAGNETIC FIELDS, ELECTROSTATIC FIELDS, DIAGNOSIS(GENERAL), GEOMAGNETISM, DENSITY, GRADIENTS, DIAMAGNETISM, EXOSPHERE, MONITORING, THREE DIMENSIONAL, TRANSVERSE, NEUTRAL, PARTICLE BEAMS, PHOTODIODES

GEORGIA INST OF TECH ATLANTA SCHOOL OF GEOPHYSICAL SCIENCES

(U) Influence Scattering and Q in the Lithosphere.

DESCRIPTIVE NOTE: Final technical rept. 15 Nov 82-14 Nov 84.

IDENTIFIERS: (U) Plasmoids, Time of flight probes.

*Plasma beams. Neutral plasma beam propagation. Bounded plasma beams

NOV 84 82P

PERSONAL AUTHORS: Dainty, A. M.; Duckworth, R. M.; Tie, A. ;

CONTRACT NO. AFOSR-83-0037, ARPA Order-4397

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-85-0101

UNCLASSIFIED REPORT

ABSTRACT: (U) This project examined the contribution of scattering to the attenuation of short pulses within the crust. Coda decay and excitation for local events were examined at Mammoth Lakes and Morgan Hill, Calif., Monticello, SC; and New Brunswick, Canada, in the frequency range 3-50 Hz. For short times (less than 10 seconds), the total turbidity determined from coda decay was about 0.1/km for all regions, applying a magnitude bias of 0.2 in m sub b if 10 km of such material is traversed. Since the total turbidity is independent of frequency, implying geometrical scattering, this would not be detectable by spectral radio methods. The backscattering turbidity determined from coda excitation at short times indicates strong scattering in the upper crust, especially for frequencies in the 3-10 Hz range. At times longer than 10-15 seconds for the codas from the eastern North American regions, Monticello and New Brunswick, the coda energy appeared to be channeled into a horizontally propagating mode such as Lg. The total turbidity for this portion of the coda was lower than for the short codas, about 0.01/km, indicating less scattering, a result born out by the backscattering turbidity. Codas from California, however, did not show this phenomenon, indicating either that this mode is not present or that it is more strongly scattered. This result indicates that attenuation for Lg can be estimated

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from the coda after 10 seconds, as proposed by other workers.

PEDA CORP PALO ALTO CA

DESCRIPTORS: (U) *RADIO TRANSMISSION, *WAVE PROPAGATION, EARTH CRUST, SOUTH CAROLINA, BACKSCATTERING, TURBIDITY, NEW BRUNSWICK, ATTENUATION, LITHOSPHERE

(U) Forebody and Baseflow of a Dragbrake OTV (Orbital Transfer Vehicle) by an Extremely Fast Single Level Implicit Algorithm.

JUN 84 13P

IDENTIFIERS: (U) WJAFOSR2309A1, PE61102F

PERSONAL AUTHORS: Lombard, C. K. ; Venkatapathy, E. ; Bardina, J. ;

CONTRACT NO. F49620-83-C-0084

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0114

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in American Inst. of Aeronautics and Astronautics, p1-11 Jun 84.

ABSTRACT: (U) We present a new, computationally efficient single level effectively explicit implicit algorithm for gasdynamics. The method meets all the requirements for unconditionally stable global iteration over flows with mixed supersonic and subsonic zones including bluff body flow and boundary layer flows with strong interaction and streamwise separation. For hyperbolic (supersonic flow) regions the method is automatically equivalent to contemporary space marching methods. For elliptic (subsonic flow) regions, rapid convergence is facilitated by alternating direction solution sweeps which bring both sets of eigenvectors and the influence of both boundaries of a coordinate line equally into play. Point by point updating of the data with local iteration on the solution procedure at each spatial step as the sweeps progress not only renders the method single level in storage but, also, improves nonlinear accuracy to accelerate convergence by an order of magnitude over related two level linearized implicit methods. The properties and performance of the technique are demonstrated in a variety of quasi 1-D nozzle flows including completely subsonic or supersonic or mixed subsonic/supersonic with sonic points and shocks. The technique is applied as a method of lines in two

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SEARCH CONTROL NO. EVL05A

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hypersonic blunt body flow problems: a classical sphere cylinder problem previously studied experimentally and computationally and the coupled forebody and base flow of a model drag brake AOTV. The early results support the belief that the new algorithm has the potential to make accurate computations of AOTV flowfields substantially faster and less costly than currently available explicit or two level time dependent implicit methods. Keywords include: Reprints.

DESCRIPTORS: (U) *BASE FLOW, INTERACTIONS, FLOW SEPARATION, NUMERICAL METHODS AND PROCEDURES, ONE DIMENSIONAL FLOW, NOZZLE GAS FLOW, SHOCK, HYPERSONIC FLOW, BOUNDARY LAYER FLOW, COMPUTATIONS, GAS DYNAMICS, BLUNT BODIES, ITERATIONS, MIXING, ALGORITHMS, ORBITS, TRANSFER, REPRINTS, SUBSONIC FLOW, SUPERSONIC FLOW, BRAKES, DRAG, CONVERGENCE, EIGENVECTORS

IDENTIFIERS: (U) Orbital transfer vehicles, Space marching methods, Forebody flow, Dragbrake, WUAFOSR2304A3, PE61102F

WASHINGTON UNIV ST LOUIS MO SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) H- and p-Version Finite Element Analyses of a Rhombic Plate.

84 8P

PERSONAL AUTHORS: Wang, D. W.; Katz, I. N.; Szabo, B. A.;

CONTRACT NO. AFOSR-81-0252

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-85-0112

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. for Numerical Methods in Engineering, v20 p1399-1405, 1984.

ABSTRACT: (U) A simply-supported rhombic plate with obtuse angle equal to 150 degrees is analysed by the finite element method, using both the h-version and the newer p-version. Results obtained using the computer code CONE (C(1)-continuity) for plate bending problems are compared with theoretical predictions and with computational results reported in the literature. If accuracy in terms of the number of degrees-of-freedom is used as a criterion, the solutions presented here are the most efficient that have been published to date. Keywords include: Reprints. (Author).

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, PLATES, BENDING, COMPUTATIONS, DEGREES OF FREEDOM, SOLUTIONS(GENERAL), ACCURACY, REPRINTS

IDENTIFIERS: (U) *Rhombic plates, WUAFOSR2304A3, PE61102F

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AD-A150 930 12/1

AD-A150 926 8/13 20/11

CALIFORNIA UNIV SANTA BARBARA

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Unitarily Invariant Generalized Matrix Norms and Hadamard Products.

(U) Response of Saturated Soils to Dynamic Loading.

84 19p

DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-31 Jan 84.

84 19p

JUN 84 67P

PERSONAL AUTHORS: Marcus, M. ; Kidman, K. ; Sandy, M. ;

PERSONAL AUTHORS: Sandhu, R. S. ; Hong, S. J. ; Aboustitt, B. L.

CONTRACT NO. AFOSR-83-0150

PROJECT NO. 2304

REPORT NO. OSURF-715107-84-4

TASK NO. A3

CONTRACT NO. AFOSR-83-0055

MONITOR: AFOSR

PROJECT NO. 2307

TR-85-0115

UNCLASSIFIED REPORT

TASK NO. C1

MONITOR: AFOSR
TR-85-0092

SUPPLEMENTARY NOTE: Pub. in Linear and Multilinear Algebra, v18 p197-213 1984.

Reprint: Unitarily Invariant Generalized Matrix Norms and Hadamard Products.

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *LINEAR ALGEBRA, *MATRICES(MATHEMATICS), NORMALITY, INVARIANCE, THEOREMS, REPRINTS

ABSTRACT: (U) The transient response of saturated porous soils to time dependent boundary conditions is analyzed. Galerkin finite element method is used to set up the spatial discretization of Biot's equations of wave propagation through linearly elastic fluid-saturated porous medium. Wilson's beta-gamma-theta algorithm is used to integrate the equations of motion. The procedure is applied to several one-dimensional steady state and transient problems. Excellent agreement with the analytic solutions was obtained with 'proper' selection of time-integration parameters.

IDENTIFIERS: (U) Hadamard products, Matrix norms, WUAFOSR2304A3, PE61102F

DESCRIPTORS: (U) *SOIL MECHANICS, *DYNAMIC LOADS, *SOILS, MATHEMATICAL ANALYSIS, EQUATIONS OF MOTION, FINITE ELEMENT ANALYSIS, POROUS MATERIALS, TIME DEPENDENCE, WAVE PROPAGATION, ONE DIMENSIONAL, STEADY STATE, SATURATION, TRANSIENTS

IDENTIFIERS: (U) WUAFOSR2307C1, PE61102F, LPN-OSURF-783420/715107

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AD-A150 922 20/14

RENSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING

KANSAS UNIV/CENTER FOR RESEARCH INC LAWRENCE REMOTE SENSING LAB

(U) Combustion Kinetics of Metal Oxide and Halide Radicals.

(U) Analytical Studies and Experimental Measurements of Amplitude and Phase of Near-Field Range Antenna Probes.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 83-30 Nov 84,

DESCRIPTIVE NOTE: Final rept. 1 May 83-30 Jun 84,

JAN 85 15P

MAY 84 19P

PERSONAL AUTHORS: Fontijn, A. ;

PERSONAL AUTHORS: Biggs, A. W. ;

CONTRACT NO. AFOSR-82-0073

REPORT NO. CRINC/RSL-TR-8190-F

PROJECT NO. 2308

CONTRACT NO. AFOSR-83-0190

TASK NO. A1

PROJECT NO. 2305

MONITOR: AFOSR
TR-85-0078

TASK NO. D9

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental measurements on isolated elementary metallic radical oxidation reactions over wide temperature ranges are described. Reactions of importance to advanced propulsion systems are studied. The temperature dependence of the rate coefficients of many of the reactions deviate strongly from the commonly used Arrhenius equation. Therefore, extrapolations, based on this equation, from narrow to wide intervals can not be used. Results for the reaction $\text{AlO}+\text{CO}_2$ yield AlCO_2+CO from 450-1300K are given. The rate coefficient expression equals 2×10 to the -14th power $\exp(530/T)$ 3cc molecule s. The reaction thus has a slight negative temperature dependence. It is concluded that the $\text{O}-(\text{AlO})$ bond formed has an energy equal to or exceeding 530 kJ/mol, much larger than reported in the literature. A possible reason for this disagreement is discussed. Originator supplied keywords include: Combustion kinetics, High temperature, Metal halides, Metal oxides, Rocket propulsion, and Ramjets.

DESCRIPTORS: (U) *REACTION KINETICS, *OXIDATION REDUCTION REACTIONS, *COMBUSTION, *OXIDES, *HALIDES, *METAL COMPOUNDS, ALUMINUM OXIDES, CARBON DIOXIDE, ALUMINIZED PROPELLANTS, HIGH TEMPERATURE, COEFFICIENTS, RATES, RAMJET ENGINES, ROCKET PROPULSION

IDENTIFIERS: (U) WJAFOSR2308A1, PE61102F

AD-A150 924

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UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of probe antenna errors in the basic theory of probe compensated near-field measurements for arbitrary antenna are presented. The study encompassed: (1) measurements made in the near-field of the arbitrary test antenna; (2) directional effects of probe antennas on reception by test antennas; and (3) computed patterns of test antennas that span a solid angle instead of one or two principal plane cuts. Results of experimental measurements conducted are reported with both advantages and disadvantages discussed. Fields from the test and probe antennas are expressed in elementary plane wave expansions and the Lorentz reciprocity theorem is used to calculate the output.

DESCRIPTORS: (U) *PROBES(ELECTROMAGNETIC), *ANTENNAS, AMPLITUDE, PHASE, ERRORS, NEAR FIELD

IDENTIFIERS: (U) WJAFOSR2305D9, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 920 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL
ENGINEERING

(U) Basic Instability Mechanisms in Chemically Reacting
Subsonic and Supersonic Flows.

DETONATIONS, GASES, COMBUSTORS, SHEAR PROPERTIES,
TURBULENCE, ACTIVATION ENERGY, LOW FREQUENCY, ACOUSTIC
WAVES, WAVE PROPAGATION, FLAME PROPAGATION

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F

DESCRIPTIVE NOTE: Final rept. 30 Sep 78-29 Sep 83.

NOV 83 22P

PERSONAL AUTHORS: Toong, T. Y. ;

CONTRACT NO. AFOSR-78-3662

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0104

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the main results and conclusions obtained in a research program on basic instability in chemically reacting subsonic and supersonic flows. Problems studied included (1) Nonlinear wave-kinetic interactions (2) Sustenance, structure and initiation of gaseous detonations (3) Sustenance of low-frequency instability in dump combustors (4) Onset of instability in reacting shear flows and (5) Temporal development of turbulence-combustion interactions. Both linear and nonlinear coupling between chemical kinetics and gas dynamics were found to play important roles in triggering and sustaining instabilities in these problems. Of special significance were the effects due to non-dimensional activation energy and Damkohler's similarity parameters and possible selective amplification within specific frequency bands as governed by chemical kinetics. Originator supplied keywords include: Instability Mechanisms; Wave-kinetic Interactions; Linear and Nonlinear Coupling; Sustenance, Structure and Initiation of Gaseous Detonations; Low-Frequency Instability in Dump Combustors; Onset of Instability in Reacting Shear Flows; Turbulence-Combustion Interactions.

DESCRIPTORS: (U) *COMBUSTION, *SUBSONIC FLOW,
*SUPERSONIC FLOW, COMBUSTION STABILITY, REACTION KINETICS,
INTERACTIONS, COUPLING(INTERACTION), COUPLING(INTERACTION)

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AD-A150 919 CONTINUED

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

(U) Consistency in Least-Squares Estimation: A Bayesian Approach.

84 8P

PERSONAL AUTHORS: Rootzen, H.; Sternby, J. ;

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0145

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Automatica, v20 n4 p471-475
1984.

ABSTRACT: (U) In a previous paper the convenience of using Martingale theory in the analysis of Bayesian least-squares estimation was demonstrated. However, certain restrictions had to be imposed on either the feedback structure or on the initial values for the estimation. In the present paper these restrictions are removed, and necessary and sufficient conditions for strong consistency (in a Bayesian sense) are given for the Gaussian white noise case without any assumptions on closed loop stability or on the feedback structure. In the open-loop case the poles are shown to be consistently estimated, almost everywhere, and in the closed loop case certain choices of control law are shown to assure consistency. Finally adaptive control laws are treated, and implicit self-tuning regulators are shown to converge to the desired control laws. This is a reprint. Key words include: Least squares; Bayesian statistics; convergence analysis; adaptive control; Martingale approach.

DESCRIPTORS: (U) *BAYES THEOREM, *ESTIMATES, *LEAST SQUARES METHOD, REPRINTS, TUNING, SELF OPERATION, STATISTICS, CLOSED LOOP SYSTEMS, STABILITY, FEEDBACK, ADAPTIVE CONTROL SYSTEMS, CONSISTENCY, CONVERGENCE, OPEN LOOP SYSTEMS, WHITE NOISE

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AD-A150 900 20/12 20/3

WASHINGTON UNIV ST LOUIS MO SCHOOL OF ENGINEERING AND APPLIED SCIENCE

BATTELLE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Implementation of a C1 Triangular Element Based on the p-Version of the Finite Element Method.

(U) Electrical and Thermal Transport Property Studies of High-Temperature Thermoelectric Materials.

DESCRIPTIVE NOTE: Research progress and forecast rept. 15 May-31 Dec 84.

84 13P

PERSONAL AUTHORS: Wang, D. W.; Katz, I. N.; Szabo, B. A.;

DEC 84 7P

CONTRACT NO. AFOSR-81-0252

PERSONAL AUTHORS: Bates, J. L.;

PROJECT NO. 2304

CONTRACT NO. F49620-83-C-0109

TASK NO. A3

PROJECT NO. 2308

MONITOR: AFOSR

TASK NO. A2

TR-85-0113

MONITOR: AFOSR

TR-85-0138

UNCLASSIFIED REPORT

ABSTRACT: (U) The implementation of a computer code CONE (for C(1) continuity) based on the p-version of the finite element method is described. A hierarchical family of triangular finite elements of degree $p > 0$ or $= 5$ is used. This family enforces C(1) continuity across inter-element boundaries, and the code is applicable to fourth order partial differential equations in two independent variables, in particular to the biharmonic equation. Applications to several benchmark problems in plate bending are presented. Sample results are examined and compared both with theoretical predictions and with the computations of other programs. Significant improvements are shown for the results obtained using CONE.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *FINITE ELEMENT ANALYSIS, PROBLEM SOLVING, PARTIAL DIFFERENTIAL EQUATIONS, FUNCTIONS(MATHEMATICS), VARIABLES, COMPUTATIONS, FORTRAN, DERIVATIVES(MATHEMATICS), REPRINTS

IDENTIFIERS: (U) Cone computer program, Shape functions, WUAFOSR2304A3, PE61102F

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AD-A150 900

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UNCLASSIFIED REPORT

ABSTRACT: (U) High-temperature materials that exhibit small polaron conduction appear to exhibit the highest figures of merit. A thermoelectric model based on small polaron transport has been developed. The model predicts that broad-band semiconductors with small polarons hopping along inequivalent sites of distorted sublattices can result in increases in both the electrical conductivity and the Seebeck coefficient with increasing temperature without significant increases in thermal conductivity. High figures of merit (ZT), greater than 1 at 1000K, that increase with increasing temperatures are predicted. The model is being applied to the divalent metal containing (Y,La)CrO(3) systems with an AB0(3) perovskite structure. Transport properties have been determined for various doping elements and for different compositions. These data are being used for the evaluation of this model. Additional keywords: rare earth, oxysulfides.

DESCRIPTORS: (U) *ELECTRICAL CONDUCTIVITY, *THERMAL CONDUCTIVITY, *SEMICONDUCTORS, *RARE EARTH ELEMENTS, FIGURE OF MERIT, HIGH TEMPERATURE, DOPING, SULFIDES, SEEBECK EFFECT, MODELS

IDENTIFIERS: (U) Polarons, PE61102F, WUAFOSR2306A2

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 897 12/1

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF
AEROPHYSICS AND AEROSPACE ENGINEERING

AD-A150 893

12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) A Note on the Mathematical Formulation of the Problem
of Numerical Coordinate Generation.

(U) On a Problem Concerning Spacings.

84

16P

JUL 83 17P

PERSONAL AUTHORS: Cheng, S. ;

PERSONAL AUTHORS: Warsi, Z. U. A. ;

REPORT NO. TR-23

CONTRACT NO. AFOSR-80-0185

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A3

TASK NO. A5

MONITOR: AFOSR
TR-85-0110

MONITOR: AFOSR

TR-85-0141

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Quarterly of Applied
Mathematics, p221-236 Jul 83.SUPPLEMENTARY NOTE: Pub. in Zeitschrift fur
Wahrscheinlichkeitstheorie und Verwandte Gebiete, v66
p245-258 1984.

ABSTRACT: (U) A set of second order partial differential equations for the generation of three-dimensional grids around and between arbitrary shaped bodies has been proposed. These equations basically depend on the Gauss equations for a surface and have been structured in such a way that an automatic connection is established between the succeeding generated surfaces. The vanishing of the Riemann curvature tensor has been used to isolate those fundamental equations which every coordinate system in either two- or three-dimensional Euclidean space must satisfy. Keywords include: Reprints. (Author)

ABSTRACT: (U) Let a sequence of independent uniformly distributed random variables be the spacings induced by the order statistics of U sub $1, \dots, U$ sub $(n-1)$. The exact distribution is determined, and based on analysis of something called Fibonacci distribution, the weak and almost sure convergence of the sequence are discussed. Furthermore, the limiting distribution is determined for any fixed 1 and the equation is shown for some sequence $(1 \text{ sub } n)$. Keywords include: Reprints.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS,
*GRIDS(COORDINATES), SURFACES, REPRINTS, THREE
DIMENSIONAL, CURVATURE, TENSORS

DESCRIPTORS: (U) *SEQUENCES(MATHEMATICS), EQUATIONS,
DISTRIBUTION, RANDOM VARIABLES, CONVERGENCE, ORDER
STATISTICS, REPRINTS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A3

IDENTIFIERS: (U) *Spacings, PE61102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 889 7/4 21/8 21/2

AD-A150 884 20/3 7/5 20/8

MACKAY SCHOOL OF MINES RENO NV DEPT OF CHEMICAL AND
METALLURGICAL ENGINEERING

WISCONSIN UNIV-MADISON DEPT OF PHYSICS

(U) The Vapor Pressure of HCl - Water and Salt - HCl -
Water Solutions Below 0C.

(U) Experimental and Theoretical Studies of Optogalvanic
Effects in Neon Discharges.

DESCRIPTIVE NOTE: Final rept. 1 Dec 81-30 Nov 83.

NOV 83 12P

PERSONAL AUTHORS: Lawler, J. E.; Doughty, D. K.;

JAN 84 11P

CONTRACT NO. AFOSR-81-0208

PERSONAL AUTHORS: Miller, E.;

PROJECT NO. 2301

CONTRACT NO. AFOSR-77-3333, AFOSR-82-0049

PROJECT NO. 2308

TASK NO. A7

TASK NO. A1

MONITOR: AFOSR
TR-85-0126

MONITOR: AFOSR
TR-85-0084

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl De Physique, conf C7
suppl 11 v44 pC7-45/C7-54 Nov 83.

ABSTRACT: (U) Liquid solution analyses were completed. The complete vapor-liquid equilibria data are tabulated for hydrochloric acid solutions ranging in molality from 5.0 to 15.7, saturated with CaCl₂ at nominal temperatures ranging from 0 to -40C. The CaCl₂-HCl-water system exhibits a maximum pressure azeotrope under these conditions. Pure hydrochloric acid and NaCl-HCl-water systems exhibit minimum pressure azeotropes in the same temperature range. At acid molalities greater than about 9, the vapor phase contains about 94% HCl and for all molalities there is an increase in the partial pressures of HCl and water over what is observed with pure hydrochloric acid. Because of these characteristics, it is predicted that the presence of CaCl₂ in reduced smoke rocket plumes will not contribute as strongly to secondary smoke as will NaCl. Originator supplied keywords include: Plumes, Salt solutions, Partial pressures, Hydrochloric acid, Sodium chloride.

DESCRIPTORS: (U) *HYDROCHLORIC ACID, *SALINE SOLUTION, *VAPOR PRESSURE, *EXHAUST PLUMES, *ROCKET EXHAUST, SMOKE ABATEMENT, EQUILIBRIUM(GENERAL), CALCIUM COMPOUNDS, CHLORIDES, AZEOTROPES, SODIUM CHLORIDE, PARTIAL PRESSURE, SMOKE, VAPOR PHASES

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1

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ABSTRACT: (U) An experimental and theoretical investigation of the 594.5 nm optogalvanic effect in the Ne positive column is described. The effect is a decrease in discharge conductance due to a laser induced depletion of metastable atoms. Absolute measurements of the effect per unit of absorbed laser power are reported for a wide range of discharge conditions. Positive column discharges with radius-pressure products of 0.1 cm-Torr to 1.0 cm-Torr and with sustaining direct currents of 1 to 16 mA are studied. The effect is modeled in this regime by applying perturbation theory to key rate equations that describe discharge. The model predictions are in agreement with an experimental measurements. Absolute densities of atoms excited to the 2p53s levels are also reported. The studied regime covers the transition from a discharge sustained primarily by single-step electron impact ionization to a discharge sustained primarily by two-step ionization via the 2p53s metastable levels. The global power balance of the discharge is dominated by wall losses of atoms excited to the 2p53s levels at all pressures and currents studied.

DESCRIPTORS: (U) *GAS DISCHARGES, *NEON, ATOMIC ENERGY LEVELS, EXCITATION, MATHEMATICAL MODELS, REPRINTS, DENSITY, LASERS, ATOMS, CONDUCTIVITY, METASTABLE STATE, ELECTRON IMPACT SPECTRA, IONIZATION

AD-A150 884

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AD-A150 884 CONTINUED

AD-A150 881 11/6 12/1

AUBURN UNIV AL DEPT OF MECHANICAL ENGINEERING

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A7

(U) Ordered Carbon Metal Alloys for Extraterrestrial Power Systems.

DESCRIPTIVE NOTE: Interim rept. Apr 83-Apr 84.

JUL 84 59P

PERSONAL AUTHORS: Chin, B. A.; Madsen, N. H.; Gills, P. F.; Su, S. C.;

CONTRACT NO. AFOSR-83-0168

PROJECT NO. 2308

TASK NO. K1

MONITOR: AFOSR
TR-85-0159

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical methods of predicting ordering parameters of carbon metal based systems have been investigated. Preliminary methods of calculating the critical ordering temperature, and the maximum degree of order have been used to examine the characteristics of C-Zr, C-Mo, C-Ti and C-V systems. Based upon these calculations, the C-Ti system has been chosen as the most promising system in which the ultrahigh strength, ductility and temperature resistance, properties desired for space power generation materials, can be obtained. Fifteen titanium based alloys have been manufactured using an arc melting furnace to compare experimentally the effect of carbon content on the ordering parameters of carbon metal alloys with theoretical predictions. The alloys produced contained between 0 and 53 atom percent (0 to 22 weight percent) carbon. This first group of alloys did not contain transition and rare earth additions required for ductility improvement. This will allow an unperturbed comparison of ordering parameter theory with experimental results. Optical metallography and hardness tests have been completed on these alloys with interesting results for alloys containing between 35 and 53 atomic percent (12 to 22 weight percent) carbon. These alloys were found to contain significant amounts of phases not predicted from the phase diagrams. X-ray diffraction tests are being conducted to identify these

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AD-A150 881 CONTINUED

constituents. An additional ten alloys have been manufactured using a new induction generator purchased under the contract. Originator supplied keywords include: Cluster-variation, Concentration waves and Band theory.

DESCRIPTORS: (U) *MATHEMATICAL PREDICTION, *COMPUTATIONS, *CARBON ALLOYS, DUCTILITY, POWER SUPPLIES, SPACE ENVIRONMENTS, HARDNESS, METALLOGRAPHY, THERMAL RESISTANCE, TITANIUM ALLOYS

AD-A150 878 11/4 11/5

ECOLE NATIONALE SUPERIEURE DES MINES EVRY (FRANCE)
CENTRE DES MATERIAUX*

(U) Damage Estimation in Carbon Fibre Reinforced Epoxy and Its Influence on Residual Properties.

DESCRIPTIVE NOTE: Final rept. 15 Jun 82-14 Jun 83.

AUG 83 35P

PERSONAL AUTHORS: Bunsell, A. R.; Valentin, D.;

CONTRACT NO. AFOSR-82-0141

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR
TR-85-0135

UNCLASSIFIED REPORT

ABSTRACT: (U) Tensile and creep tests of unidirectional and cross piled specimens were conducted and all tests were monitored for acoustic emission. Failure of unidirectional composites is related directly to failure of fibers which can be regularly and reproducibly correlated with acoustic emission count. A relationship had been postulated earlier relating emission rate and total emission count. A parameter n has been added to this relationship which still allows remarkable correlation even for some nonunidirectional laminates. As the angles of fiber layup increase and mechanisms other than fiber breakage become more important the value of n decreases from unity. For unidirectional laminates a model for total number of fiber breaks can be related to a critical load transfer length using certain probabilities of fiber breakage given no adjacent fiber breaks, one adjacent fiber break, two adjacent fiber breaks, and so on. The resulting predictions correlate very well with a Weibull distribution description of the actual data with a Weibull shape parameter of four. From the model this would indicate that three adjacent breaks lead to final failure, which is considered highly likely. The effects of time and temperature on load transfer length are very important since the gradual increase in load transfer length has the effect of increasing the stresses in unbroken fibers. Originator-supplied keywords

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SEARCH CONTROL NO. EVL05A

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AD-A150 817 CONTINUED

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE
ENGINEERING

(U) Behavior of Advanced and Composite Structures.

DESCRIPTIVE NOTE: Final scientific rept. 1 Jan 82-31 Jan
83.

MAR 83 13P

PERSONAL AUTHORS: Rehfield, L. W. ;

CONTRACT NO. AFOSR-82-0080

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR
TR-85-0137

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes the objectives and accomplishments of three tasks performed under one year grant from AFOSR to complete ongoing research. Task 1 is concerned with the development and validation of new bending and buckling theories for composite structures. Task 2 is the experimental investigation of the effects of delamination on the compressive buckling and postbuckling of composite laminated panels. Task 3 is an experimental evaluation of damage tolerance of composite isogrid panels. Isogrid is a stiffening concept that employs a repetitive triangular pattern of ribs. Papers, reports, and presentations resulting from this research are listed. In Task 1, new theories which include the effects of transverse shear strain, transverse normal strain, stretching related warping and bending related warping on composite laminates, orthogonally stiffened composite plates and composite isogrid plates have been developed, validated, and applied. In case of isogrid panels, comparisons of predictions for compressive buckling have been made with experiment and found to be quite good. In Task 2, the data indicate that delaminations reduce initial postbuckled stiffness. They do not influence, however, the failure process. This is because they were placed in the center of the panels and ultimate failure begin at the corners. Originator-supplied keywords include:

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Advanced Structures, Composite Structures, Composite Laminates, Composite Plate Theory, Delamination, Isogrid Structures, Stiffened Structures.

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *GRIDS, *LAMINATES, AIR FORCE RESEARCH, FAILURE(MECHANICS), BENDING, GRANTS, BUCKLING, THEORY, PLATES, DAMAGE, TOLERANCE, STIFFENING, SHEAR STRENGTH, STRAIN(MECHANICS), TRANSVERSE, COMPRESSIVE PROPERTIES, RIBS, VALIDATION

IDENTIFIERS: (U) Composite laminates, Delamination, Composite plate theory, Isogrid structures, PE81102F, WUAFOSR230782

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 820 CONTINUED

calculations.

DESCRIPTORS: (U) *ANIONS, *REACTION KINETICS,
*PLASMAS(PHYSICS), SURFACES, QUANTUM THEORY, ION SOURCES,
HYDROGEN, DEUTERIUM, DENSITY, POTENTIAL ENERGY

IDENTIFIERS: (U) Ion molecule interactions.
WJAFOSR2301A7, PEB1102F

AD-A150 819 11/2 11/4 20/11

MATERIALS SCIENCES CORP SPRING HOUSE PA

(U) Fracture Behavior of Ceramic Composites.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 82-31 Jul
83,

AUG 83 78P

PERSONAL AUTHORS: Buesking, K. W. ; Chatterjee, S. N. ;

REPORT NO. MSC/TFR/1402/1503

CONTRACT NO. F49620-82-C-0041

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR
TR-85-0044

UNCLASSIFIED REPORT

ABSTRACT: (U) A combined experimental and analytical study is described which investigated the strength and fracture toughness of whisker reinforced ceramics. Experiments were performed on Al203 reinforced with SiC whiskers mechanically loaded in four-point flexure. The results showed an increase in flexural strength and KIC as the whisker content of the composites was increased. Several fracture and strength theories were compared to the experimental results. The hypothesis which appeared most consistent with the data treated the composites as though they contained inherent flaws which were the length of the mean free path between reinforcing whiskers. Using this crack size, the measured flexural strength of the composites could be predicted by applying linear elastic fracture mechanics. Originator-supplied key words include: Ceramic matrix composites.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *COMPOSITE MATERIALS, *FRACTURE(MECHANICS), *TOUGHNESS, WHISKER COMPOSITES, DEFECTS(MATERIALS), HYPOTHESES, MATRIX MATERIALS, CRACKS, FLEXURAL STRENGTH, ELASTIC PROPERTIES, REINFORCING MATERIALS

IDENTIFIERS: (U) Ceramic Matrix composites, PEB1102F,
WJAFOSR2307B2

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implanted silicon are included which demonstrate the resolution and sensitivity of this technique.

DESCRIPTORS: (U) *ACOUSTIC IMAGES, *PHOTOTHERMAL PROPERTIES, IMAGE PROCESSING, EQUATIONS, ACOUSTIC LENSES, HIGH RESOLUTION, FILMS, SILICON, HIGH FREQUENCY

IDENTIFIERS: (U) *Photoacoustics, Thermoacoustic field equations, WUAFOSR2306A2, PE81102F

AD-A150 820 20/9 20/8

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 83-1 Jun 84.

JUL 84 31P

PERSONAL AUTHORS: Michels, H. H. ; Hobbs, R. H. ;

REPORT NO. UTRC/R84-926533

CONTRACT NO. F49620-83-C-0094

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0125

UNCLASSIFIED REPORT

ABSTRACT: (U) This technical program constitutes a theoretical research investigation of the kinetic mechanisms of negative ion formation in plasmas. This study was directed toward elucidating the mechanisms of the most important volume-dependent reactions that occur in hydrogen-ion H- (D-) source devices, primarily of the Beichenko-Dimov-Dudnikov (BDD) type. The primary goal of this research program was to identify the most important reactions leading to H- (D-) production or destruction and to estimate these reaction rates as a function of system parameters such as density, composition and temperature. A further goal was to explore new chemical sources for the production of light mass negative atomic ions. The results of this program furnish data and provide direction for more detailed investigations into the kinetics of both gas phase and gas-surface reaction rates of importance in ion source devices and provide input for reliable modeling of such systems. This investigation was carried out using quantum mechanical methods. Both ab initio and density functional approaches were employed in these studies. Originator-supplied keywords included: potential energy surface, negative ion, configuration-interaction, density-functional method, ion-molecule reactions, density-functional, ab initio

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AD-A150 820

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AD-A150 823 14/5 20/8

ALUMINIZED PROPELLANTS, MATHEMATICAL MODELS,
MICROSTRUCTURE, PARTICLE SIZE, COMPOSITION(PROPERTY),
VARIATIONS, CROSS FLOW, VELOCITY, OSCILLATION, PRESSURE,
MICROSTRUCTURE

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS
(U) Photoacoustic Imaging.

DESCRIPTIVE NOTE: Final rept. 30 Jun 82-29 Jun 84.

IDENTIFIERS: (U) WUAFOSR2308A1, PE81102F

OCT 84 106P

PERSONAL AUTHORS: Williams, C. C. ; Quate, C. F. ;

REPORT NO. GL-3777

CONTRACT NO. AFOSR-82-0248

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-85-0124

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the final report on the work done in the area of high resolution photoacoustic and photothermal imaging. It contains recent advances in photoacoustic and photothermal theory and the experimental demonstration of new techniques. Photoacoustic and photothermal theories have been extended to include the effects of the highly focused optical power sources necessary for high resolution imaging and three high frequency techniques (1 GHz) have been demonstrated and used to characterize the material properties of solids. The formalism behind photothermal characterization of solids is established under general focusing conditions. The three dimensional thermoacoustic field equation is derived and discussed. Two high resolution photoacoustic techniques have been demonstrated. These techniques involve the use of an acoustic lens for collection for the acoustic power generated by a highly focused optical beam modulated at 1 GHz frequency. Images of gold and laser recrystallized silicon films are presented demonstrating the high resolution and sensitivity of these techniques. A high resolution photothermal probe has been demonstrated. This optical technique provides a means of photothermal characterization with sub-micrometer resolution and high sensitivity. The theory behind the probe is presented along with the experimental verification. Images of boron

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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AD-A150 827 19/1 21/9.2

DESCRIPTORS: (U) *AERDELASTICITY, *CONTROL SYSTEMS,
*FLUTTER, SERVOMECHANISMS, CONTROL THEORY, AERODYNAMIC
CONTROL SURFACES, AIRFOILS, NONLINEAR SYSTEMS, NONLINEAR
ANALYSIS, DAMPING, FEEDBACK, PASSIVE SYSTEMS, SUPERSONIC
FLOW, PERTURBATIONS

JET PROPULSION LAB PASADENA CA

(U) Non-Steady Combustion of Composite Solid Propellants.

DESCRIPTIVE NOTE: Final rept. 1 Oct 80-31 Mar 84.

MAY 84 54P

IDENTIFIERS: (U) *Nonlinear control, Control laws,
*Flutter taming, Aeroservoelastic systems, Flutter
suppression, Limit cycle, WUAFOSR230709, PE61102F

PERSONAL AUTHORS: Cohen, N. S.; Strand, L. D.;

REPORT NO. JPL-D-1802

CONTRACT NO. AFOSR-ISSA-83-00052

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0103

UNCLASSIFIED REPORT

ABSTRACT: (U) Analytical models were developed for the linearized pressure-coupled and velocity-coupled combustion response functions of composite propellants. The theory is that compositional fluctuations occur in the course of composite propellant burning, that these fluctuations originate from the inherent heterogeneity of the propellant microstructure, and that they will contribute to the nonsteady combustion under oscillating pressure (and velocity) conditions. Properties of the response to compositional fluctuations were determined and compared with responses to pressure and velocity fluctuations in series of parametric studies. The response to compositional fluctuations was found to be relatively strong response. Each response tended to increase with increasing AP particle size and pressure, and with decreasing mean crossflow velocity. A series of experiments was carried out with three propellants to determine whether or not certain features of the microstructure could be measured and correlated with response function behavior. Additional tasks pertaining to nonlinear combustion response and high frequency combustion response were performed and are described in the text. A list of publication generated by or in the course of this program is presented.

DESCRIPTORS: (U) *COMPOSITE PROPELLANTS, *COMBUSTION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A150 834 20/4 12/1

TEXAS UNIV AT AUSTIN ELECTRONICS RESEARCH CENTER

BOSTON UNIV MA CENTER FOR COMPUTATIONAL AND APPLIED DYNAMICS

(U) Annual Report on Electronics Research at the University of Texas at Austin.

(U) Flutter Taming - A New Tool for the Aeroelastic Designer.

DESCRIPTIVE NOTE: Rept. no. 31, 1 Apr 83-31 Mar 84.

DESCRIPTIVE NOTE: Final rept. 1 Apr 83-30 Apr 84.

MAY 84 109P

JUN 84 77P

PERSONAL AUTHORS: Powers, E. J. ;

PERSONAL AUTHORS: Morino, L. ;

CONTRACT NO. F49620-82-C-0033

REPORT NO. CCAD-TR-84-01

MONITOR: AFOSR

TR-85-0160

CONTRACT NO. AFOSR-83-0163

UNCLASSIFIED REPORT

PROJECT NO. 2307

ABSTRACT: (U) This report summarizes progress on projects carried out at the Electronics Research Center at The University of Texas at Austin and which were supported by the Joint Services Electronics Program. In the area of Information Electronics progress is reported for projects involving (1) nonlinear estimation and detection; (2) electronic time-variant signal processing, and (3) digital time series analysis with applications to nonlinear wave phenomena. In the Solid State Electronics area recent findings in (1) solid state interface reactions and instabilities, (2) electronic properties and structure of metal silicides and interfaces, and (3) implantation and interface properties of Inp and related compounds are described. In the Quantum Electronics area progress is presented for the following projects: (1) quantum effects in laser induced damage, (2) nonlinear Raman scattering from molecular ions and (3) nonlinear optical interactions. In the Electromagnetics area progress in guided waves in composite structures is summarized.

DESCRIPTORS: (U) *ELECTROMAGNETISM, *ELECTRONICS, *QUANTUM ELECTRONICS, *SOLID STATE ELECTRONICS, DETECTION, ELECTROMAGNETIC FIELDS, ELECTRONIC EQUIPMENT, SIGNAL PROCESSING, RESEARCH FACILITIES, INTERFACES, MOLECULAR IONS, COMPOSITE STRUCTURES, DIGITAL SYSTEMS, TIME SERIES ANALYSIS, WAVEFORMS, LASER DAMAGE, ESTIMATES, NONLINEAR SPECTRA, SILICIDES

IDENTIFIERS: (U) WJAFOSR2305A9, PE81102F

AD-A150 836

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UNCLASSIFIED REPORT

ABSTRACT: (U) A new concept for the design of aeroservoelastic systems is introduced: flutter taming by nonlinear control, i.e., use of nonlinear terms in the equation to ensure that the behavior of the system beyond the flutter speed is of benign rather than destructive nature. This is accomplished by using a very simple nonlinear control law. It is shown (using a singular perturbation analysis about the stability boundary) that flutter taming is always possible for an aeroservoelastic system that can be represented by a system of nonlinear differential equations with analytical nonlinearities. It is important to emphasize that the control system for flutter taming is fully nonlinear, and therefore it does not affect the linear behavior (in particular the stability characteristics) of the system. Hence, flutter taming can be used in conjunction with flutter suppression by active control to increase the flutter speed. Applications of the theory to the case of an airfoil in supersonic flow are presented. In addition to an active control modification (use of control surface with nonlinear feedback), passive modifications (e.g. a nonlinear damper) are also investigated. Originator-supplied key words include: Nonlinear analysis, and Limit cycle.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 838 12/1

AD-A150 837 7/4 7/5

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Attainable Rates of Convergence of Maxima.

(U) Theory of Laser-Induced Surface Chemistry with Applications to Microelectronics and Heterogeneous Catalysis.

AUG 84 4P

SEP 84 12P

PERSONAL AUTHORS: Rootzen, H. ;

PERSONAL AUTHORS: Lin, J. T. ; Murphy, W. C. ; George, T. F. ;

CONTRACT NO. F49620-82-C-0009

CONTRACT NO. AFOSR-82-0048

PROJECT NO. 2304

PROJECT NO. 2303

TASK NO. A5

TASK NO. A2

MONITOR: AFOSR TR-85-0142

MONITOR: AFOSR TR-85-0152

UNCLASSIFIED REPORT

ABSTRACT: (U) Any exponential rate of convergence can be obtained for maxima of i.i.d. random variables, while faster than exponential convergence implies that the variables have extreme value distribution. Key words include: Maxima of i.i.d. sequences, Rate of convergence, and Reprints. (Author)

UNCLASSIFIED REPORT

ABSTRACT: (U) Theory and experiments are reviewed for how laser radiation can stimulate various component mechanisms which contribute to the complex chemistry involved in heterogeneous catalysis. These mechanisms include the processes of adsorption, desorption, migration and chemical reactions at a gas-solid interface. Applications of laser-induced surface chemistry to microelectronics in circuit deposition, lithography, annealing and final testing of the circuit are discussed. In addition to the review, some new theory is presented. Originator-supplied keywords include: Review article, Laser-induced surface chemistry, Microelectronics, Heterogeneous catalysis, Adsorption, Migration, Desorption, Chemical reactions, Lithography, and Annealing.

DESCRIPTORS: (U) *CONVERGENCE, *EXPONENTIAL FUNCTIONS, *RATES, SEQUENCES(MATHEMATICS), VALUE, DISTRIBUTION, REPRINTS, RANDOM VARIABLES

IDENTIFIERS: (U) Maxima, WUAFOSR2304A5, PE61102F

DESCRIPTORS: (U) *LASERS, *SURFACE CHEMISTRY, MICROELECTRONICS, CATALYSIS, HETEROGENEITY, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303A2, PE61102F

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MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE AND
PLASMA DYNAMICS LAB

loads. WUAFOSR2307A4, PE81102F

(U) A Two-Dimensional Design Method for Highly-Loaded
Blades in Turbomachines.

DESCRIPTIVE NOTE: Technical rept..

APR 83 129P

PERSONAL AUTHORS: Dang, T. Q.; McCune, J. E.;

REPORT NO. GT/PDL-173

CONTRACT NO. F49620-82-K-0002

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-85-0086

UNCLASSIFIED REPORT

ABSTRACT: (U) This thesis presents a practical design method for highly-loaded blades in an isolated cascade. The flow is assumed to be incompressible and inviscid. The upstream inlet flow condition is taken to be uniform. The goals of this research are to provide a practical numerical code for the design problem, and a non-linear theory which can be easily expanded to three-dimensions. The theory is based in part on the Clebsch formulation. The blade profile is determined iteratively through the blade boundary conditions using a 'smoothing' technique. A practical numerical code is presented for the design problem using 'partial smoothing'. The program gives very fast convergence solutions with satisfactory accuracy for practical solidity range. Originator-supplied keywords include: Turbomachinery; Cascades; Inviscid flow; and Computational fluid dynamics.

DESCRIPTORS: (U) *TURBINE BLADES, *CASCADE STRUCTURES, INCOMPRESSIBLE FLOW, NONLINEAR ANALYSIS, LOADS(FORCES), COMPUTER AIDED DESIGN, TURBOMACHINERY, INVISCID FLOW, NUMERICAL ANALYSIS, CONVERGENCE, SOLUTIONS(GENERAL), COMPUTATIONS, FLUID DYNAMICS, THEORY, THESES, INLETS

IDENTIFIERS: (U) Computational fluid dynamics, Blade

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 848 20/8 7/4

AD-A150 848 CONTINUED

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE61102F, WUAFOSR230381

(U) Vibrational Relaxation of Highly Excited Diatomics. IV.
HF($v=1-7$) + CO₂, N₂O, and HF.

OCT 83 10P

PERSONAL AUTHORS: Dzelzkalns, L. S.; Kaufman, F.;

CONTRACT NO. AFOSR-80-0207

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-85-0154

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v79
n8 p3836-3844, 15 Oct 83, See also AD-A150 806.

ABSTRACT: (U) Vibrational relaxation rate constants are measured for HF($v = 1-4$) with Q = CO₂, N₂O, and HF by the fast flow infrared chemiluminescence technique using four HF(v) generating reactions whose initial vibrational distributions are found to be unrelaxed. The data are combined with earlier results for $v = 5, 6$, and 7 to provide information on v dependence and quenching mechanism. The rate constants k superscript Q sub V, V-1 range from 1.2×10 to the -12 power to 4.5×10 to the -10 power cc/s and increase with power law exponents n of 2.7 to 3.0 in directly proportional to v superscript n for all three quenchers. The relaxation is principally V-1 for CO₂ and N₂O, but mainly V-R,T for HF, at least for the higher v levels. The relaxation rate constants are compared with theoretical estimates and from a valuable data base for future theoretical work. Originator supplied keywords include: Vibrational relaxation rate constants; Flow infrared chemiluminescence technique; and Vibrational distributions.

DESCRIPTORS: (U) *MOLECULAR VIBRATION,
*CHEMILUMINESCENCE, *RELAXATION, *DIATOMIC MOLECULES,
REACTION KINETICS, HYDROGEN FLUORIDE, CARBON DIOXIDE,
NITROUS OXIDE, REPRINTS, QUENCHING, FLOW, INFRARED,
RADIATION, CONSTANTS, RATES

AD-A150 848

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AD-A150 854 20/11 11/4 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA
AD-A150 854 CONTINUED

FLORIDA UNIV GAINESVILLE DEPT OF ENGINEERING SCIENCES

(U) Stress Distribution of Aligned Short-Fiber Composites
under Axial Load.

APR 84 15P

REPRINTS, INTERFACIAL TENSION, SHAPE, PLOTTING,
VISCOELASTICITY, LOADS(FORCES), FIBERS, COORDINATES,
FUNCTIONS, FINITE ELEMENT ANALYSIS, NUMERICAL ANALYSIS,
GEOMETRIC FORMS, NORMAL DISTRIBUTION, PHOTOELASTICITY,
STRESS CONCENTRATION

PERSONAL AUTHORS: Sun, C. T.; Wu, J. K. ;

IDENTIFIERS: (U) *Fiber fiber composites, WUAFOSR2303A3,
PE61102F

CONTRACT NO. AFOSR-83-0154

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0158

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Reinforced Plastics
and Composites, V3 p130-144 Apr 84.

ABSTRACT: (U) The objective of this paper is to investigate the normal and interfacial shear stress distribution of short-fiber composites under a force either parallel to the fiber or making some angle with the fiber. Different geometrical shapes of fiber end were taken into account. The geometrical shapes under investigation were: rectangular, semi-circular, V-shaped and wedge-shaped respectively. Analytical solutions of this problem were achieved by using finite-element numerical scheme. Numerical results of normalized stress $\sigma_{sub f}$ and shear stress τ were plotted as a function of the coordinate along the fiber direction. It was observed that, the distributions of $\sigma_{sub f}$ and τ were in good agreement with existing results obtained experimentally by using photoelasticity method. It was also observed that shear stress concentration is very high near the fiber tip. This phenomenon is particularly true for wedge and V-shaped fiber ends. A possible application of this investigation is to optimize internal damping of short-fiber composites by properly adjusting fiber end geometry. Originator supplied keywords include: Interfacial shear stress; Short-fiber composites; Geometrical shapes; Photoelasticity method; Viscoelastic matrix.

DESCRIPTORS: (U) *COMPOSITE MATERIALS. *SHEAR STRESSES.

AD-A150 854

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 861 CONTINUED

ELLIPSES, MATHEMATICAL MODELS, SPATIAL DISTRIBUTION,
THREE DIMENSIONAL, EXTERNAL, INTERNAL, SURFACES

IDENTIFIERS: (U) CRAY-1 computers, Body fitted
coordinates systems, Elliptic partial differential
equations

AD-A150 855 20/10 12/1

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Coupled-Cluster Methods for Molecular Calculations,
84 34P

PERSONAL AUTHORS: Bartlett, R. J. ; Dykstra, C. E. ; Paldus, J.

CONTRACT NO. AFOSR-92-0026

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-85-0074

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Advanced Theories and
Computational Approaches to the Electronic Structure of
Molecules, p127-159 1984.

ABSTRACT: (U) Coupled-cluster (CC) theory for the
accurate treatment of electron correlation is presented
including its similarities and differences from
configuration interaction (CI). Topics addressed include
computational aspects of the CC method; extended CC
methods that include single, double, and triple
excitation operators; and a multi-reference CC technique.
Numerical examples illustrate CC results for correlation
energies compared to those from full CI and multi-
reference CI calculations. (Author)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES,
*MOLECULES, COUPLING(INTERACTION), CLUSTERING, QUANTUM
THEORY, ELECTRONIC STATES, REPRINTS, CORRELATION, ENERGY,
EXCITATION, CONFIGURATIONS, INTERACTIONS

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SEARCH CONTROL NO. EVLOSA

AD-A150 868 20/8

AD-A150 881 12/1 20/4 1/3

FLORIDA UNIV GAINESVILLE DEPT OF NUCLEAR ENGINEERING
SCIENCESMISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF
AEROPHYSICS AND AEROSPACE ENGINEERING(U) Feasibility of Optical Instruments Based on
Multiaperture Optics.(U) The Generation of Three-Dimensional Body-Fitted
Coordinate Systems for Viscous Flow Problems.

DESCRIPTIVE NOTE: Final rept. 15 Jun 83-30 Sep 84,

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84,

OCT 84 18P

OCT 84 63P

PERSONAL AUTHORS: Cox, J. D.; Schneider, R. T.; James, J. H.

PERSONAL AUTHORS: Warsi, Z. U. A.;

CONTRACT NO. AFOSR-83-0240

CONTRACT NO. AFOSR-80-0185

PROJECT NO. 2305

PROJECT NO. 2304

TASK NO. B1

TASK NO. A3

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0111

TR-85-0148

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper deals with a recognition system specialized for low pixel numbers. It is assumed that the image consists of 15 x 15 pixels. Using such a low pixel number, the object is distorted beyond recognition if its straight edges are not lined up with the grid. This is especially important if the previously described method based on interpretation of each pixel row as a binary number is used. Therefore, it is shown that a given image of a randomly oriented object can be rotated by a subroutine requiring only little processing time. The resultant image deviates only to a minute degree from the image which would have been observed with its straight edges lined up with the pixel grid. Originator-supplied key words included: Low Pixel Numbers, Pattern Recognition, Multiaperture Optics, Recognition Coefficient.

ABSTRACT: (U) The problem of numerical generation in surfaces and in three-dimensional configurations through elliptic Partial Differential Equations has been pursued under this grant. The developed mathematical model has been programmed on CRAY-1 and has been tested for single and two-body configurations enclosed in a single boundary and for generation of coordinates in a single surface. The main aim of this research has been to develop and implement a technique for the generation of spatial coordinates in 3D regions enclosed by arbitrary smooth surfaces for ultimate use in the numerical solution of the Navier-Stokes equations. In this regard, a mathematical model based on a set of elliptic PDE's has been developed, which has been used to generate smooth coordinates in the region formed by arbitrary inner and outer surfaces of known shapes, around multibodies, particularly around a wing-body combination. These equations have also been used to generate surface coordinates in arbitrary surfaces and are also capable of coordinate redistribution in any desired manner both in 3D regions and in 2D surface regions.

DESCRIPTORS: (U) *OPTICAL INSTRUMENTS, FEASIBILITY STUDIES, PATTERN RECOGNITION, APERTURES, OPTICS, COEFFICIENTS, SUBROUTINES

IDENTIFIERS: (U) Pixels, Multiaperture optics, PE61102F, WUAFOSR2305B1

DESCRIPTORS: (U) *WING BODY CONFIGURATIONS, *GRIDS(COORDINATES), *PARTIAL DIFFERENTIAL EQUATIONS, *VISCIOUS FLOW, NUMERICAL METHODS AND PROCEDURES, NAVIER STOKES EQUATIONS, AERODYNAMIC CONFIGURATIONS, ELLIPSOIDS,

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AD-A150 881

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A150 875 13/8 20/12 20/5 AD-A150 875 CONTINUED

TECHNION - ISRAEL INST OF TECH HAIFA SOLID STATE INST

PE81102F

(U) Laser Annealing of Ion Implanted HgCdTe.

DESCRIPTIVE NOTE: Final rept. 1 Oct 81-30 Sep 84.

OCT 84 29P

PERSONAL AUTHORS: Kalish, R. ;

CONTRACT NO. AFOSR-82-0001

PROJECT NO. 2308

TASK NO. C2

MONITOR: AFOSR
TR-85-0118

UNCLASSIFIED REPORT

ABSTRACT: (U) The Structural and electrical changes caused by the implantation and annealing of donor and acceptor ions into Hg_{1-x}Cd_xTe (x=0.2-0.3) were studied by a variety of ion-beam probing (RBS or PIXE combined with channeling) and electrical (C-V, Hall, photodiodes) techniques. Several annealing procedures (Furnace, Q switched Ruby laser and CW CO₂ laser) were tried. Best annealing was obtained when the implanted HgCdTe was heated for 0.4 seconds to 380 deg C by exposing it to a flash of photons delivered by a CW CO₂ laser. This novel mode of Rapid Thermal Annealing is shown to recover the crystal structure without causing changes in stoichiometry and to electrically activate both donor (B) and acceptor (P) implants. Mesa and planar p on n photodiodes, sensitive to IR radiation (3.5-5 micrometers, were obtained when this annealing procedure was employed to P implanted (200keV, 2x10 to the 14th power/sq.cm) n-Hg_{0.71}Cd_{0.29}Te. Originator supplied keywords include: Ion implantation, Laser annealing, HgCdTe, Radiation damage, Defects in semiconductors.

DESCRIPTORS: (U) *SEMICONDUCTORS, *ANNEALING, *LASER APPLICATIONS, *ION IMPLANTATION, MERCURY COMPOUNDS, CADMIUM TELLURIDES, DEFECTS(MATERIALS), CARBON DIOXIDE LASERS, CONTINUOUS WAVE LASERS, CRYSTAL STRUCTURE, PHOTODIODES, RADIATION DAMAGE, Q SWITCHING, RUBY LASERS

IDENTIFIERS: (U) DOS(Density of States), WUAFOSR2308C2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 878 CONTINUED

include: Acoustic emission, Composites, Composites failure, Continuous fiber composites, Fiber fracture, Residual strength.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *CARBON FIBERS, *CARBON REINFORCED COMPOSITES, RESIDUAL STRESS, FAILURE, DAMAGE ASSESSMENT, ACOUSTIC EMISSIONS, FRACTURE(MECHANICS), LIFE EXPECTANCY(SERVICE LIFE)

IDENTIFIERS: (U) Continuous fiber composites, Residual strength, WUAFOSR230782, PE61102F

AD-A150 876 20/8 20/14

BATTELLE COLUMBUS LABS OH

(U) Millimeter-Wave Diffraction Devices and Materials.

DESCRIPTIVE NOTE: Final rept. 1 Sep 82-31 Oct 84.

DEC 84 140P

PERSONAL AUTHORS: Seiler, M. R. ; Ridgway, R. W. ;

CONTRACT NO. F49620-82-C-0099

PROJECT NO. 2308

TASK NO. B2

MONITOR: AFOSR
TR-85-0131

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental results of a study to explore millimeter-wave beam-steering by techniques of diffraction are presented. When periodic structures, such as metallic gratings, are brought into proximity with a dielectric waveguide, radiation or reception of radiation at a controlled angle is possible. The direction of the beam is controlled by the period of the grating while the half-power beamwidth is controlled by the total length of the grating. Results are given for a variety of gratings formed by metallic blocks, ferro-fluid, and springs. Photoconductive gratings, varistors, and bulk acoustic wave devices were among other techniques researched in this program. Results indicate that the laser-excited photoconductive grating has promising potential for rapid beam steering. Additional keywords: Silicon, Cadmium, Sulfides, Ferrites, Semiconductors, Gallium arsenides. (Author)

DESCRIPTORS: (U) *DIFFRACTION ANALYSIS, *BEAM STEERING, *MILLIMETER WAVES, EXPERIMENTAL DATA, PHOTOCONDUCTIVITY, LASER APPLICATIONS, EXCITATION, ACOUSTIC WAVES, FERRITES, SEMICONDUCTORS, SPRINGS, CADMIUM, DIELECTRICS, WAVEGUIDES, GALLIUM ARSENIDES, GRATINGS(SPECTRA), RADIATION, SILICON, SULFIDES, VARISTORS

IDENTIFIERS: (U) PE61102F, WUAFOSR230882

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 815 8/15

AD-A150 808 12/1

SOUTHERN ILLINOIS UNIV SCHOOL OF MEDICINE SPRINGFIELD

SOUTH CAROLINA UNIV COLUMBIA DEPT OF MATHEMATICS AND STATISTICS

(U) Acute Effects of Anticholinesterase Agents on Pupillary Function.

(U) Nonparametric Estimation from Accelerated Life Tests with Random Censorship,

DESCRIPTIVE NOTE: Progress rept. 15 Mar-15-Sep 84,

SEP 84 14P

84 14P

PERSONAL AUTHORS: Giacobini, E. ;

PERSONAL AUTHORS: Padgett, W. J. ; McNichols, D. T. ;

CONTRACT NO. AFOSR-83-0051

CONTRACT NO. AFOSR-81-0168

PROJECT NO. 2312

PROJECT NO. 2304

TASK NO. A3

TASK NO. A5

MONITOR: AFOSR
TR-85-0072

MONITOR: AFOSR
TR-85-0144

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Three main directions of our research have been pursued. First, we have accumulated new pharmacological evidence for a mechanism of acetylcholine release related to a muscarinic autoreceptor present in the rat iris. Secondly, we have continued our study drug effect on the release of acetylcholine, adding a new group of drugs, the aminopyridines, which enhance calcium ions influx into the neuron. Finally, we have studied the effect of aging on pupillary function and Ach metabolism. These three lines of work have each produced novel and intriguing results which are summarized in the following section. The results described in this report have been communicated at several national and international meetings. The abstracts of the communications are attached to the progress report.

DESCRIPTORS: (U) *CHOLINES, *ACETYLCHOLINE, *CHOLINESTERASE INHIBITORS, CHEMORECEPTORS, PHYSIOLOGICAL EFFECTS, CALCIUM, IONS, RELEASE, PHARMACOLOGY, METABOLISM, NERVE CELLS, IRIS, RATS

IDENTIFIERS: (U) Muscarinic receptors, PEB1102F, WJAFOSR2312A3

AD-A150 815

UNCLASSIFIED

SUPPLEMENTARY NOTE: Pub. in Reliability Theory and Models, p155-167 1984.

ABSTRACT: (U) For an accelerated life test, let V sub k denote k fixed accelerated stresses and let V sub 0 be the normal stress. It is assumed that the probability distributions corresponding to the accelerated stresses differ from the nonaccelerated life distribution only by a scale factor. A simple nonparametric consistent estimator of the life distribution at the normal stress is developed for randomly right-censored data. The estimator also applies to accelerated life test data for items with two independent failure modes (or competing risks) at each stress level. An example is given to illustrate the estimation procedure. Reprints. (Author).

DESCRIPTORS: (U) *ACCELERATED TESTING, *LIFE TESTS, *NONPARAMETRIC STATISTICS, PROBABILITY DISTRIBUTION FUNCTIONS, REPRINTS, STRESSES, EXPERIMENTAL DATA, ESTIMATES, SCALING FACTORS

IDENTIFIERS: (U) *Random censorship, WJAFOSR2304A5, PEB1102F

AD-A150 808

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 806 20/8 7/4

AD-A150 805 20/2 7/3

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Vibrational Relaxation of Highly Excited Diatomics. V.
The V-V Channel in HF(v)+HF(0) Collisions,

(U) Molecular Theory of Liquid Crystals,

OCT 83 5P

84 37P

PERSONAL AUTHORS: Dzelzkalns, L. S. ; Kaufman, F. ;

PERSONAL AUTHORS: Flory, P. J. ;

CONTRACT NO. AFOSR-80-0207

CONTRACT NO. AFOSR-82-0009

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B1

TASK NO. A3

MONITOR: AFOSR
TR-85-0155

MONITOR: AFOSR
TR-85-0151

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v79
n7 p3363-3368, 1 Oct 83.

SUPPLEMENTARY NOTE: Pub. in Advances in Polymer Science,
v59 p1-38 1984.

ABSTRACT: (U) The V-V fraction in HF self-relaxation is determined in fast-flow infrared chemiluminescence experiments through the consistent accounting of all HF(v) populations in partially relaxed mixtures. The v-level specific, fractional V-V probabilities $f_{\text{sub } v}$ are measured for $v = 2$ and 3 using the F+H₂ and F+CH₄ generating reactions, and estimates are obtained for $v = 4$ to 7 using F+HBr and H+F₂ data. A consistent set of $f_{\text{sub } v}$'s is 0.55 + or - 0.10, 0.30 + or - 0.10, 0.15 + or - 0.10, and zero for $v = 2, 3, 4$, and 5 to 7, respectively. These values are compared with one recent laser measurement for $v = 2$ and with the theoretical predictions of semiclassical trajectory calculations. Originator supplied keywords include: HF Self-relaxation, fast-flow infrared chemiluminescence, semiclassical trajectory calculations.

DESCRIPTORS: (U) *HYDROGEN FLUORIDE, *MOLECULAR VIBRATION, *CHEMILUMINESCENCE, *DIATOMIC MOLECULES, *RELAXATION, COLLISIONS, REPRINTS, TRAJECTORIES, COMPUTATIONS

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F

AD-A150 806

AD-A150 805

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ABSTRACT: (U) This reprint presents the lattice theory of liquids consisting of rodlike molecules with emphasis on polymers exhibiting nematic or cholesteric liquid crystallinity. Steric repulsions between the solute particles are principally responsible for order in lyotropic liquid-crystalline systems. In the case of rigid rods, the axial ratio of the particles governs the concentration at which separation of a nematic or cholesteric phase sets in. For semi-rigid chains such as those of cellulose and its derivatives, the axial ratio of the Kuhn segment is the relevant parameter. These and other predictions of the lattice theory are confirmed by numerous experiments. Liquid crystallinity may be promoted by orientation-dependent intermolecular attractions between extended chain molecules. Such forces originate in the anisotropy of the polarizabilities of groups, e.g. phenylene, in the main chain. They may be especially important in thermotropic melts and concentrated solutions.

DESCRIPTORS: (U) *CRYSTAL LATTICES, *LIQUID CRYSTALS, *MOLECULAR STRUCTURE, REPRINTS, ANISOTROPY, CELLULOSE, CHOLESTEROL, POLARIZATION, POLYMERS, SOLUTES

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 802 11/9 20/11

AD-A150 801 8/11 17/10 18/3

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND
MATERIALS RESEARCH CENTER

RONDOUT ASSOCIATES INC STONE RIDGE NY

(U) Research on Composite Materials for Structural Design.

(U) Regional Seismic Wave Propagation.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 82-15 Feb
84.DESCRIPTIVE NOTE: Final technical rept. 1 Oct 82-30 Sep
84.

APR 84 311P

NOV 84 254P

PERSONAL AUTHORS: Allen, D. ; Bradley, W. ; Groves, S. ; Ham, J.
; Harbert, B. ;PERSONAL AUTHORS: Carter, J. A. ; Peseckis, L. L. ; Pomeroy, P.
W. ; Sutton, G. H. ;

REPORT NO. MM-4685-84-5

CONTRACT NO. F49620-83-C-0017, ARPA Order-4493

PROJECT NO. F49620-82-C-0057

PROJECT NO. 4493

TASK NO. 2307

TASK NO. 01

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0004

TR-85-0226

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Summarized are research activities related to advanced fiber reinforced plastics in the areas of fracture, delamination, distributed damage, residual stresses, moisture effects, and toughening mechanisms in elastic and viscoelastic materials. Also included are abstracts of the six M.S. theses and one Ph.D. dissertation completed during the project period. The Appendix contains full papers and additional abstracts of work done on the project. Additional keywords: Resins, Adhesives, Fracture(Mechanics), Structural mechanics, Polymers. (Author)

DESCRIPTORS: (U) *FIBER REINFORCEMENT, *REINFORCED PLASTICS, STRUCTURAL PROPERTIES, TOUGHNESS, ADHESIVES, FRACTURE(MECHANICS), ELASTIC PROPERTIES, VISCOELASTICITY, RESIDUAL STRESS, DAMAGE, MOISTURE, COMPOSITE MATERIALS

IDENTIFIERS: (U) PE61102F, WUAFOSR230782

AD-A150 802

AD-A150 801

UNCLASSIFIED

PAGE 176 EVLOSA

ABSTRACT: (U) Work has involved evaluation of method for using regional seismic waves, particularly Lg for yield determination. The Wake Island Hydrophone Array digital recording continues to provide high quality data. Polarization and array analyses have been made of Catskill Seismic Array and Regional Seismic Test Network data. For continental models, whole waveform synthetics demonstrate clearly the large dependence of the amplitude and spectral shape on the focal depth and the smaller dependence of these factors on focal mechanism. The broadband digital seismic station, SONY has been in operation since 18 May 1984. Digital data are recorded magnetic cartridge tapes each capable of holding 67 Megabytes or 38 hours of data. Many programs have been developed for data handling and analysis. Keywords include: Pn and Sn, Yield determination, and Depth discrimination.

DESCRIPTORS: (U) *SEISMIC WAVES, *SEISMIC DATA, *YIELD(NUCLEAR EXPLOSIONS), DETERMINATION, POLARIZATION, DEPTH, DISCRIMINATION, REGIONS, SEISMIC ARRAYS, NETWORKS, BROADBAND, WAVE PROPAGATION, REGIONS, UNITED STATES, USSR, DATA PROCESSING, WAVE ANALYZERS, NUCLEAR EXPLOSION TESTING, UNDERGROUND EXPLOSIONS, SYNTHESIS, EARTH MODELS

IDENTIFIERS: (U) Lg wave propagation, Telesismic waves.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 801 CONTINUED

AD-A150 800 20/14 12/1

Regional seismic waves. Synthetic seismograms, PE82714E,
WUAFOSR449301

TEXAS UNIV AT AUSTIN GEOTECHNICAL ENGINEERING CENTER

(U) Wave Propagation in Heterogeneous Media.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-15 Feb 84.

JUN 84 197P

PERSONAL AUTHORS: Suddhiprakarn,C. ;

CONTRACT NO. AFOSR-83-0082

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0099

UNCLASSIFIED REPORT

ABSTRACT: (U) The propagation of stress wave due to a point type excitation in the form of a sinusoidal pulse in an infinite medium with inclusions having different properties is studied. The solution is carried out using the boundary element method in the frequency domain with a Discrete Fourier transform. The inclusion-medium interfaces are discretized using a constant element which assumes a uniform stress and displacement field over the element. Studies were conducted primarily with a two-dimensional plane strain model but some were also performed in the three-dimensional case, focusing on the attenuation characteristics and the velocity of the wave in terms of the arrival time for both the free field and the case with inclusions. Results are presented in the form of a dimensionless displacement and arrival times at the target under consideration. With a point excitation, as used in this study, the free field attenuation follows the geometrical damping law for both the two and the three-dimensional cases, except at distances in the neighborhood of one wavelength or closer, where a more complex pattern of wave propagation is developed. Originator-supplied keywords: Wave propagation, Effect of Inclusions, Soil dynamics, Propagation velocities, Attenuation.

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES,
*STRESS WAVES, *WAVE PROPAGATION, MATHEMATICAL MODELS,
INTERFACES, THREE DIMENSIONAL, DISCRETE FOURIER
TRANSFORMS, FREE FIELD, FREQUENCY, HETEROGENEITY, MEDIA.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 800 CONTINUED

AD-A150 791 20/4 21/2

ATTENUATION, BOUNDARIES, DISPLACEMENT, DAMPING, GEOMETRY,
EXCITATION, VELOCITY, TWO DIMENSIONAL, SOIL DYNAMICS

SPECTRON DEVELOPMENT LABS INC COSTA MESA CA

IDENTIFIERS: (U) PE81102F, WUAFOSR2307C1

(U) A Fundamental Study of Liquid Phase Particle Breakup.
Revision.

DESCRIPTIVE NOTE: Final rept.

DEC 84 57P

REPORT NO. SDL-84-2193-11F

CONTRACT NO. F49620-81-C-0032

MONITOR: AFOSR
TR-85-0080

UNCLASSIFIED REPORT

ABSTRACT: (U) Combustion efficiency of aluminized propellants in solid rocket motors is reduced by incomplete aluminum combustion and two-phase nozzle flow losses. Combustion of these propellants can produce large Al/A12O3 agglomerates. As a direct result of agglomerate breakup, the aluminum combustion rate is increased, and the thermal energy released is more efficiently transferred into exhaust kinetic energy. This research sought to obtain physical data to characterize the mechanisms of aerodynamic droplet breakup. Experiments have been completed in which conventional liquids and a liquid metal (mercury) was studied. The primary goal of the conventional liquid experiments was to examine the effect of liquid properties (viscosity and surface tension) on the breakup mechanism, time scale, and fragment size distribution. The goal of the mercury experiments was to examine the effect of the much higher surface tension more characteristic of liquid aluminum. A key element of the experimental effort is the use of nonintrusive laser diagnostics including pulsed laser holography (PLH) and laser Doppler velocimetry (LDV). The exceptional temporal and spatial resolution of PLH provided the ability to resolve the mechanism of breakup and the size distribution of the fragments. LDV was used to determine drop velocity distributions along the nozzle revealing the rapid acceleration of the flattened droplets and then, surprisingly, the milder acceleration of the fragments.

DESCRIPTORS: (U) *DISINTEGRATION, *COMBUSTION,
*AERODYNAMICS, *DROPS, PARTICLE SIZE, BURNING RATE.

AD-A150 800

AD-A150 791

UNCLASSIFIED

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SEARCH CONTROL NO. EVLOSA

AD-A150 791 CONTINUED

AD-A150 773 12/1

ACCELERATION, EFFICIENCY, DISTRIBUTION, ALUMINIZED
PROPELLANTS, INTERFACIAL TENSION, LASER VELOCIMETERS,
LIQUID METALS, HOLOGRAPHY, SOLID PROPELLANT ROCKET
ENGINES, MERCURY, VISCOSITY

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

(U) Prediction of Stable Processes: Spectral and Moving
Average Representations.

84 21P

PERSONAL AUTHORS: Campanis, S. ; Soltani, A. R. ;

REPORT NO. TR-11

CONTRACT NO. F49620-82-C-0009

MONITOR: AFOSR
TR-85-0143

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Zeitschrift fuer
Wahrscheinlichkeitstheorie und verwandte Gebiete, v66
p593-612 1984.

ABSTRACT: (U) For stable processes which are Fourier
transforms of processes with independent increments, we
obtain a wold decomposition, we characterize their
regularity and singularity, and, in the discrete-
parameter case, we derive their linear predictors. In
sharp contrast with the Gaussian case, regular stable
processes which are Fourier transforms of processes with
independent increments are not moving averages of stable
motion. The currently available representations of
stationary stable processes do not seem well suited for
use in tackling the prediction problem. Here we focus on
those regular stationary stable processes which have
moving average representations, i.e. are moving averages
of stable motion, and those which have spectral
representations, i.e. are Fourier transforms of processes
with independent stable instruments.

DESCRIPTORS: (U) *MATHEMATICAL PREDICTION, *FOURIER
TRANSFORMATION, LINEARITY, DECOMPOSITION, STABILITY,
REPRINTS, MOTION, STATIONARY

IDENTIFIERS: (U) Moving average representations,
PE61102F, WU2304A5

AD-A150 791

AD-A150 773

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 772 12/1 20/4 8/13 AD-A150 769 9/2 8/7

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) An Evaluation of Finite Element Models for Soil Consolidation.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-31 Jan 84.

APR 84 47P

PERSONAL AUTHORS: Sandhu, R. S.; Aboustit, B. L.; Hong, S. J.

REPORT NO. OSURF-715107-84-2

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0079

UNCLASSIFIED REPORT

ABSTRACT: (U) Numerical performance of Ghaboussi's isoparametric bilinear quadrilateral element, for analysis of quasi-static flow of an incompressible fluid through a linear elastic saturated porous soil, is compared with that of Sandhu's composite element in which the displacement has biquadratic interpolation. Application of both procedures to solution of one-dimensional consolidation and plain strain consolidation of the half-space under a strip load shows that Ghaboussi and Wilson's procedure gives results almost identical to those from the higher order element but is significantly more economical to use.

DESCRIPTORS: (U) *SOIL MODELS, *FINITE ELEMENT ANALYSIS, *MATHEMATICAL MODELS, INCOMPRESSIBLE FLOW, LINEARITY, ELASTIC PROPERTIES, SATURATION, POROSITY, DISPLACEMENT, FLUIDS, STATICS

IDENTIFIERS: (U) LPN OSURF-763420/715927, PE61102F, WUAFOSR2307C1

AD-A150 772

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OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) A Computer Program for Dynamic Response of Layered Saturated Sands.

DESCRIPTIVE NOTE: Interim rept. 1 Feb 83-31 Jan 84.

JUN 84 163P

PERSONAL AUTHORS: Hiremath, M. S.; Sandhu, R. S.;

REPORT NO. OSURF-715107-84-3

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0088

UNCLASSIFIED REPORT

ABSTRACT: (U) The Engineering Approach to dynamic response analysis of saturated sand deposits is investigated. The logic on which the methodology is based is described and implemented in a computer program. Application of the procedure to obtain dynamic response of a saturated sand layer, including pore pressure, shear stress, and acceleration variations under two different ground excitation histories given. Two alternative numerical procedures are investigated. The results are compared with those reported by Finn. Limitations of the approach are discussed. Originator-supplied keywords: Computer Simulation, Dynamic Response, Explosion Effects, Finite Difference Method, Layered Sands, Seepage, Liquefaction, and Seismic Response.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *COMPUTERIZED SIMULATION, *SAND, LIQUEFACTION, SEEPAGE, DYNAMIC RESPONSE, FINITE DIFFERENCE THEORY, LIMITATIONS, METHODOLOGY, PORE PRESSURE, LAYERS, EXPLOSION EFFECTS, EXCITATION, GROUND LEVEL, NUMERICAL METHODS AND PROCEDURES, DEPOSITS, SATURATION, SHEAR STRESSES

IDENTIFIERS: (U) *Layered sand, LPN OSURF-763420, LPN OSURF-715927, PE61102F, WUAFOSR2307C1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 759

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AD-A150 755

14/2

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN
OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

GEORGE WASHINGTON UNIV WASHINGTON DC SCHOOL OF
ENGINEERING AND APPLIED SCIENCE

(U) The Complexity of Reliability Computations in Planar
and Acyclic Graphs.

(U) Picosecond Lidar Techniques in Laboratory and Field
Diagnostics.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Final rept. 1 Nov 82-15 Jan 84.

DEC 84

27P

DEC 84

8P

PERSONAL AUTHORS: Provan, J. S. ;

PERSONAL AUTHORS: Goulard, R. ;

REPORT NO. UNC/DRSA/TR-83/12

CONTRACT NO. AFOSR-83-0016

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2308

PROJECT NO. 2304

TASK NO. A3

TASK NO. A5

MONITOR: AFOSR

TR-85-0085

MONITOR: AFOSR

TR-85-0085

TR-85-0095

UNCLASSIFIED REPORT

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ABSTRACT: (U) The author shows that the problem of computing source-sink reliability is NP-hard, in fact P-complete, even for undirected and acyclic directed source-sink planar graphs having vertex degree at most three. Thus the source-sink reliability problem is unlikely to have an efficient algorithm, even when the graph can be laid out on a rectilinear grid. Keywords include: Reliability; complexity; planar graph; acyclic graph; NP-hard; P-complete.

DESCRIPTORS: (U) *COMPUTATIONS, *RELIABILITY, *GRAPHS, PROBLEM SOLVING

IDENTIFIERS: (U) Planar graphs, Acyclic graphs, WUAFOSR2304A5, PE61102F

ABSTRACT: (U) The availability of picosecond laser systems opens a new potential in the field of diagnostics. It is now possible to observe chemical events over time intervals as short as 10 to the minus 9th power sec (e.g., fluorescence, bond-selective chemistry,...) without overlap with the much shorter 10 to the minus 12th power sec triggering signal. In addition, two specific effects are of special interest to real industrial flame diagnostics. One is the elimination of background noise, since the picosecond time-gating of the detector will collect the whole signal of interest but only a tiny fraction of the time-spread noise background (e.g., soot, walls,...). The other is related to the very short length of these pulses (similar to mm): it is the possibility to use the lidar/radar principle to convert the time history of the measured back scattered signals into a millimeter-resolved space distribution along the beam. In this fashion, Raman and other techniques can yield a detailed map of concentrations and temperatures in three-dimensional space, even in sooty combustors background, with the need of only one single porthole. Additional keywords: raman spectroscopy, combustion.

DESCRIPTORS: (U) *DIAGNOSTIC EQUIPMENT, *OPTICAL RADAR, HIGH RATE, COMBUSTION PRODUCTS, LABORATORY TESTS, DIAGNOSIS(GENERAL), FLUORESCENCE, RAMAN SPECTROSCOPY,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A150 755 CONTINUED

AD-A150 742 9/2 12/1

SOOT, FLAMES

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

IDENTIFIERS: (U) Picosecond rate, WUAFOSR2308A3,
PE61102F

(U) Functional Analysis of Programs.

DESCRIPTIVE NOTE: Technical rept.,

OCT 84 40P

PERSONAL AUTHORS: Hamlet, R. ; Mills, H. ;

REPORT NO. CS/E-84-008

CONTRACT NO. F49820-83-K-0018

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0054

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Oregon
Graduate Center, Beaverton, OR 97006.

ABSTRACT: (U) Analysis of computer programs using a
semantics that combines features of the operational and
denotational methods is described. The method is an
explanatory, analytic tool, a program calculus that
allows program meaning to be obtained from program syntax,
then compared to a desired meaning by a simple set-
theoretic methods. Meanings are functional, sets of
ordered (input, output) pairs. A subset of Pascal is used
to illustrate the theory. (Author).

DESCRIPTORS: (U) *FUNCTIONAL ANALYSIS, *COMPUTER
PROGRAMS, SYNTAX, CALCULUS, SEMANTICS, SET THEORY

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 741 CONTINUED

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF GEOLOGICAL SCIENCES

(U) Near-Field Source Characterizations of Explosions.

DESCRIPTIVE NOTE: Annual rept. 15 Oct 83-14 Oct 84.

NOV 84 123P

PERSONAL AUTHORS: Stump, B. W. ;

REPORT NO. SMUG-1

CONTRACT NO. AFOSR-84-0016

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-84-1279

UNCLASSIFIED REPORT

ABSTRACT: (U) Work in three areas is summarized in this report. The first deals with the quantification of source burial depth effects as observed in the near-field. The interplay of source burial depth effects with other physical processes is discussed. Preliminary data analysis and synthetics are presented. The increase in P wave amplitude and decrease in Rayleigh wave amplitude with increasing source depth is completely modeled with linear models. The second area of work summarizes a set of forward calculational models attempting to include spall in equivalent elastic source models. The study concludes that energy involved in cylindrically symmetric spall can account for 50% of near source waveforms. Finally the subject of inverse studies of small scaled chemical explosions is presented. The utility of small scaled explosion experiments in determining equivalent elastic sources is shown. The resulting source from a 253 pound chemical explosion in alluvium illustrates the partition of the explosive energy into spherical and cylindrical components. Keywords include: Seismology, explosion sources, equivalent elastic sources, depth of burial, spall, elastic wave propagation.

DESCRIPTORS: (U) *EXPLOSION EFFECTS, *SEISMIC DATA, *SEISMIC WAVES, PRIMARY WAVES(SEISMIC WAVES), SYNTHESIS.

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COMPUTATIONS, SPALLATION, SYMMETRY, SCALE, ENERGY TRANSFER, ELASTIC WAVES, WAVE PROPAGATION, ALLUVIUM, DATA PROCESSING, ELASTIC PROPERTIES, SOURCES, EXPLOSIONS, MATHEMATICAL MODELS, NEAR FIELD, BURIED OBJECTS, DEPTH, EXPLOSIVES, WAVEFORMS, AMPLITUDE, RAYLEIGH WAVES, INVERSION, LINEARITY

IDENTIFIERS: (U) Synthetic seismograms, Depth of burial, Small scale explosions, Energy partition, PEG1102F, WUAFOSR2309A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 739 21/2 20/4 14/2 AD-A150 739 CONTINUED

SHEFFIELD UNIV (ENGLAND) DEPT OF CHEMICAL ENGINEERING
AND FUEL TECHNOLOGY

(U) Fundamental Study of Three Dimensional Two Phase Flow
in Combustion Systems.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84,

NOV 84 181P

PERSONAL AUTHORS: Swithenbank, J.; Vasquez, S. A.; Wild, P.
N.;

CONTRACT NO. AFDSR-84-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0082

UNCLASSIFIED REPORT

ABSTRACT: (U) Combustion systems involve the complex interaction between several fundamental phenomena. In this investigation, the basic science underlying the interactions between the two-phase flow, fluid dynamics, and chemical kinetics have been investigated. The studies have required the development of new diagnostic systems and significant progress has been made in the following areas: - The development of a technique for making accurate droplet size measurements in dense sprays. The application of this technique to an F101 air blast atomizer. The use of LDA for the precise characterization of swirl from the F101 swirler. The development of shear stress mathematical models for non-isotropic turbulence. The application of this model to the F101 swirler. The development of a mercury vapour pulse tracer for residence time distribution measurement in combustors. The development of a mathematical modelling technique whereby the residence time distribution can be computed. Closing of the gap between stirred reactor models and finite difference models of combustion systems. Proposal of a new fundamental approach to the problem of simultaneous mixing and reaction using a quantitative coalescence/dispersion eddy concept which has the potential to represent all the high order correlations of the interaction. Originator-supplied keywords include:

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Combustion modelling; Droplet sizing, Swirling flow, Algebraic stress modelling.

DESCRIPTORS: (U) *REACTION KINETICS, *COMBUSTION, *TWO PHASE FLOW, THREE DIMENSIONAL FLOW, PARTICLE SIZE, ATOMIZATION, COMBUSTORS, SPRAYS, FINITE DIFFERENCE THEORY, MATHEMATICAL MODELS, DROPS, FLUID DYNAMICS, TURBULENCE, SHEAR STRESSES

IDENTIFIERS: (U) Swirling flow, PE61102F, WUAFOSR2308A2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 736 12/1 13/13

AD-A150 736 CONTINUED

SYSTEMS ENGINEERING FOR POWER INC ANNANDALE VA

(U) Modeling and Control of Large Flexible Structures.

DESCRIPTIVE NOTE: Final rept. 30 Sep 83-31 May 84 on Phase 1.

JUL 84 188P

PERSONAL AUTHORS: Avramovic, B. ; Barkakati, N. ; Bennet, W. ; Blankenship, G. L. ; Kwatny, H. G. ;

REPORT NO. SEPI-TR-84-9

CONTRACT NO. F49620-83-C-0159

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-85-0075

UNCLASSIFIED REPORT

ABSTRACT: (U) The main emphasis in the first phase of this work has been the adaptation and enhancement of certain Wiener-Hopf methods for control system design used by J. Davis for treatment of linear, dynamic, distributed parameter models of flexible structures. The numerical algorithms for executing the spectral factorization were based on some earlier work of F. Stenger. The Davis-Stenger methodology was adapted to the problem of vibration control of flexible structures. The spectral factorization methodology avoids the difficult numerical problems associated with the solution of the Riccati partial differential equations which arise in the time domain approach for designing stabilizing controllers. In this way distributed phenomena, like travelling waves, which characterize the macroscopic dynamics of flexible structures are retained in the model, and their interaction with the control system is preserved in the analytical design process. Computational algorithms were developed and several prototype systems were treated including the Euler Beam and a simple two dimensional system. Second part of the research involved the use of a mathematical technique for asymptotic analysis called homogenization. Homogenization of the model for a structure with a regular infrastructure

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produces a model with smoothly varying effective parameters for mass density, local tension, and damping that represents a flexible structure with a uniform homogenized internal structure. Originator-supplied keywords include: Active controls; Vibration control; Distributed feedback control; Spectral methods.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *FLEXIBLE STRUCTURES, *MATHEMATICAL MODELS, *VIBRATION, CONTROL THEORY, FEEDBACK, DISTRIBUTION, OPTIMIZATION, LINEAR SYSTEMS, STABILIZATION SYSTEMS, TRAVELING WAVES, TWO DIMENSIONAL, DYNAMIC RESPONSE, STRUCTURAL ANALYSIS, PERIODIC VARIATIONS, NUMERICAL METHODS AND PROCEDURES, ALGORITHMS, HOMOGENEITY, MASS, ESTIMATES

IDENTIFIERS: (U) Weiner Hopf methods, Active controls, Vibration control, Distributed feedback control, Homogenization, Lattice structure, Periodicity, Spectral methods, Asymptotic analysis, Large flexible structures, PE81102F, WUAF05R3005A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 733 21/9.2 21/2 20/13 14/2

AD-A150 706 20/8 7/2

SYSTEMS RESEARCH LABS INC DAYTON OH RESEARCH APPLICATIONS DIV

JET PROPULSION LAB PASADENA CA

(U) Application of Atomic Fluorescence to Measurement of Combustion Temperature in Solid Propellants.

(U) Theoretical and Experimental Studies of Stabilized Metastable Helium.

DESCRIPTIVE NOTE: Annual progress rept. 1 Aug 83-1 Aug 84.

DESCRIPTIVE NOTE: Final rept. 1 May-30 Sep 84.

DEC 84 27P

NOV 84 8P

PERSONAL AUTHORS: Goss, L. P.; Smith, A. A.;

PERSONAL AUTHORS: Zmuidzinas, J. S.;

CONTRACT NO. F49620-83-C-0138

CONTRACT NO. AFOSR-ISSA-84-00049

PROJECT NO. 2308

PROJECT NO. 3208, 2301

TASK NO. A2

TASK NO. A1

MONITOR: AFOSR TR-85-0077

MONITOR: AFOSR TR-85-0011

UNCLASSIFIED REPORT

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ABSTRACT: (U) Three rare-earth-ion crystals were shown to be good candidates for surface temperature measurements on energetic materials by laser-induced fluorescence. Dy+3:LaF3 displays a thermalization process with an energy gap of 1070/cm, resulting in a fluorescence intensity change of approx. 200 over a 700-K temperature range. Cr+3:Al2O3 (ruby) displays an extreme temperature sensitivity to the lifetime of the R-fluorescence lines. The lifetimes are observed to change by a factor of approx. 230 over a 500-K temperature range. ER+3:CaF2 shows a temperature sensitivity of 20 over a temperature range of 700 K, as measured by the lifetime of its energy level fluorescence line. Originator supplied keywords include: Surface-temperature measurement. Laser-induced fluorescence. Solid-fuel propellants. Rare-earth ions. Nonintrusive evaluation. Optical diagnostics.

DESCRIPTORS: (U) *COMBUSTION, *LASER INDUCED FLUORESCENCE, *SOLID PROPELLANTS, *SURFACE TEMPERATURE, IONIC CRYSTALS, MEASUREMENT, DIAGNOSIS(GENERAL), OPTICAL ANALYSIS, SOLID FUELS, RARE EARTH ELEMENTS

IDENTIFIERS: (U) WUHFOSR2308A2, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 696 CONTINUED

AD-A150 696 11/8 11/3

PITTSBURGH UNIV PA DEPT OF METALLURGICAL AND MATERIALS ENGINEERING

(U) Research Directed Advanced High Temperature Coating System Beyond Current State-of-the Art Systems.

DESCRIPTIVE NOTE: Annual rept. no. 4, 1 Jan 83-1 Jan 84.

DEC 84 64P

PERSONAL AUTHORS: Ashary, A.; meier, G. H.; Pettit, F. S.;

CONTRACT NO. AFOSR-80-0089

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-84-1278

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Alloy systems have been investigated to determine the reaction product barriers that can be used to provide optimum resistance to high temperature oxidation. The reaction product barriers which can be used are Al₂O₃, Cr₂O₃, and SiO₂ with the use of Cr₂O₃, being restricted to below about 1000 C due to formation of volatile products. The oxidation of nickel-silicon alloys has been studied over the internal 900-1100 C. Compositions of 20-22.5 Si have been found to form protective, adherent scales of SiO₂. The oxidation resistance of these alloys appears to be comparable to the most oxidation resistant alumina-forming alloys. The cracking and spalling of Al₂O₃ scales from alloys has been described by using acoustic emission analyses to conventional analytical techniques. It has been found that acoustic emission counts can be used to indicate the damage in alumina scales. A mechanism to describe the oxidation of oxygen active elements in alloys has been developed. The effects of yttrium and hafnium on the adherence of Al₂O₃ to NiCrAl and CoCrAl alloys has been compared. It is shown that the concentration of the oxygen active elements and the substrate composition are significant factors affecting oxide scale adherence.

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Originator supplied keywords include Silica scales; Isothermal oxidation; Cyclic oxidation; Acoustic emission experiments.

DESCRIPTORS: (U) *COATINGS, *HEAT RESISTANT ALLOYS, *OXIDATION RESISTANCE, ALUMINUM OXIDES, CHROMIUM COMPOUNDS, NICKEL ALLOYS, SILICON ALLOYS, SPALLATION, EMISSION SPECTROSCOPY, ISOTHERMS, ADHESION, OXIDES, CRACKS, HIGH TEMPERATURE, SILICON DIOXIDE

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 589

12/1

AD-A150 588 20/5

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Limit of the Largest Eigenvalue of the Large Dimensional Sample Covariance Matrix.

DESCRIPTIVE NOTE: Technical rept.,

OCT 84 20P

PERSONAL AUTHORS: Yin, Y. Q.; Bai, Z. D.; Krishnaiah, P. R.;

REPORT NO. TR-84-44

CONTRACT NO. F49620-82-K-0001

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0008

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors showed that the largest eigenvalue of the sample covariance matrix tends to a limit under certain conditions when both the number of variables and the sample size tend to infinity. The above result is proved under the mild restriction that the fourth moment of the elements of the sample sums of squares and cross products (SP) matrix exist. Key words include: Largest eigenvalue, Sample covariance matrix, Large dimensional random matrices, Limit.

DESCRIPTORS: (U) *Matrices(Mathematics), *Eigenvalues, Covariance

IDENTIFIERS: (U) WUAFOSR2304A5, PEB1102F

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MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Spectral Measurements from a Tunable, Raman, Free-Electron Laser.

JUL 84 5P

PERSONAL AUTHORS: Fajans, J.; Bekefi, G.; Yin, Y. Z.; Lax, B.

CONTRACT NO. AFOSR-84-0026

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0058

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v53 n3 p248-249, 18 Jul 84.

ABSTRACT: (U) The outstanding capabilities of free-electron lasers (FEL) include their inherent tunability, high radiation levels, and reasonable efficiencies. It is predicted that frequency tuning of coherent, narrow-band radiation can be achieved by changing the accelerator voltage. In this paper we present what we believe is the first detailed study of the frequency versus voltage tuning of both the high- and low-frequency branches of the FEL instability under high-current-density, collective (Raman) operation, where the gain and efficiency are expected to be large. We report narrow-band spectra (delta ohms/ohms approx. 0.02) from a tunable ($\omega/\omega_0 = 18$ GHz), Raman, free-electron laser operating in a single TE₁₁ waveguide mode. rf power levels of 100 kW at an efficiency of approx. 12% have been achieved. Measured dispersion characteristics are in good agreement with theory.

DESCRIPTORS: (U) *Tunable lasers, *Raman spectra, *Free electron lasers, Coherent radiation, Voltage, Frequency, Tuning, Narrowband, Reprints

IDENTIFIERS: (U) WUAFOSR2301A1, PEB1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 804 CONTINUED

AD-A150 593 21/2 20/4 21/1

DESCRIPTORS: (U) *Alloys, *Group III compounds, *Group V compounds, *Group IV compounds, *Semiconductors, Clustering, Epitaxial growth, Heterojunctions, Composition(Property), Crystal structure, Ternary compounds, Energy gaps, Interfaces, Interactions, Parameters, Thermodynamics, Enthalpy

GOETTINGEN UNIV (GERMANY F R) INST FUER PHYSIKALISCHE CHEMIE

(U) Initiation, Stability and Limits of Detonation for Advanced Stable Airbreathing and Hybrid Propulsion Engine Design.

IDENTIFIERS: (U) Alloy composition, Fluctuations, Chalcopyrite, Interfacial energy gaps, PE61102F, WUAFOSR2308B1

DESCRIPTIVE NOTE: Final rept. 15 Mar 82-14 Mar 83.

MAY 83 29P

PERSONAL AUTHORS: Wagner, H. G. ; Jost, W. ;

CONTRACT NO. AFOSR-82-0145

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-84-1274

UNCLASSIFIED REPORT

ABSTRACT: (U) The influence of orifices on the propagation of flames in tubes has been investigated by measuring flame speeds and pressure on both sides of the orifice and by taking smear camera pictures of the flames passing through the orifice. In addition the jet ignition process was stimulated by igniting high speed jets of turbulent unburned gas with electric sparks. Pressure-time profiles and smear camera pictures give information about the flame speed in gases with very high degrees of turbulence. Originator furnished keywords include: Flames, Combustion, Detonation, Orifice plates, Initiation, Stability.

DESCRIPTORS: (U) *Combustion, *Flame propagation, *Air breathing engines, *Hybrid propulsion, Turbulent flow, Tubes, Spark ignition, Jet flow, Detonations, Combustion stability, Flames, Measurement, Velocity, Orifices, Plates, Gases

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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AD-A150 804 11/6 20/12 20/2

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

WASHINGTON UNIV ST LOUIS MO SEMICONDUCTOR RESEARCH LAB

(U) (3)-(4)-, AND (5)-Pericyclyne: Through-Bond versus through-Space Interactions,

84 8P

PERSONAL AUTHORS: Dewar, M. J. S.; Holloway, M. K.;

PERSONAL AUTHORS: Wolfe, C. M.; Muller, M. W.; Fedders, P. A.; Hsieh, S. J.; Patten, E. A.;

CONTRACT NO. F49620-83-C-0024

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0031

UNCLASSIFIED REPORT

ABSTRACT: (U) Modified Neglect of Differential Overlap (MNDO) calculations for 3-, 4-, and 5 pericyclyne indicate that interactions between triple bonds are hyperconjugative in the π system and homoconjugative in the sigma system and that 3pericyclyne may be interconverted with a valence tautomer, tricyclopropabenzene. Originator furnished keywords include: Through-bond vs. Through-space interactions.

DESCRIPTORS: (U) *Quantum chemistry, *Cyclic compounds, Benzene, Propyl radicals, Interactions, Reprints, Chemical bonds

IDENTIFIERS: (U) Pericyclics, MNDO(Modified Neglect of Differential Overlap), WUAFOSR2303B2, PE81102F

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AD-A150 804

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JUL 84 40P

REPORT NO. WU/SRL-59583A-3

CONTRACT NO. AFOSR-82-0231

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-84-1276

UNCLASSIFIED REPORT

ABSTRACT: (U) The III-V semiconducting alloys are typically grown by epitaxial techniques at temperatures where, in the absence of substrate effects, they are thermodynamically unstable. This can result in problems associated with clustering of like atoms or ordering of unlike atoms. Long-range ordering could yield interesting III-V ternary compounds. The mixing enthalpy of III-V semiconductor alloys is fairly well described by regular solution theory, with a thermodynamic interaction parameter that is sensitive to the lattice spacing of the binary constituents. An estimate of the interaction parameter is derived from a model which ascribes the mixing enthalpy to bond distortions associated with the alloy formation, and relates these to the macroscopic elastic properties of the crystal. Numerical estimates are given for the 18 alloys with cations Al, Ga, In and anions P, As, Sb, and these are compared with experimental values and alternative models. To within a single adjustable parameter, the predictions agree with experiment and are consistent with those of the delta lattice parameter (DLP) model. Originator furnished keywords include: Alloy composition; Fluctuations; Ordering; InGa1-xP; GaAs; ZnSnP2; Crystal structure; Chalcopyrite; Heterojunctions; Interfacial energy gaps.

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OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 816 8/15

AD-A150 815 20/8 7/2

SOUTHERN ILLINOIS UNIV SCHOOL OF MEDICINE SPRINGFIELD

OREGON UNIV EUGENE DEPT OF PHYSICS

(U) Acute Effects of Anticholinesterase Agents on Pupillary Function.

(U) Threshold Double Photoionization of Argon with Synchrotron Radiation,

DESCRIPTIVE NOTE: Annual rept. 1 Sep 83-15 Mar 84.

OCT 84 14P

MAR 84 58P

PERSONAL AUTHORS: Giacobini, E. ;

PERSONAL AUTHORS: Armen, G. B. ; Aberg, T. ; Karim, K. R. ; Levin, J. C. ; Crasemann, B. ;

CONTRACT NO. AFOSR-83-0051

CONTRACT NO. F49620-84-C-0039, ARPA Order-4087

PROJECT NO. 2312

PROJECT NO. 2301

TASK NO. A3

TASK NO. A4

MONITOR: AFOSR TR-84-1261

MONITOR: AFOSR TR-85-0059

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The effect of anticholinesterase agents on pupillary function and parameters of cholinergic activity were investigated both in vitro and in vivo following topical administration. The study describes changes in three different aspects of cholinergic function: (1) uptake of choline, (2) release of acetylcholine and (3) AChE activity and pupil size. Our results are consistent with the concept of existence of a presynaptic muscarinic autoreceptor which is affected (DFP directly or through acetylcholine). DFP exerts multiple effects on various cholinergic parameters.

ABSTRACT: (U) Auger satellite have been measured to determine the probability of M-shell excitation accompanying K-shell photoionization of Ar, as function of photon energy. The theoretically predicted difference between the dependence of shakeup and shakeoff probabilities on the photon energy near threshold is demonstrated. Results are critically compared with calculations. Originator-supplied keywords include: Photoionization, Synchrotron radiation, Electron correlation, and Atomic physics. (Author)

DESCRIPTORS: (U) *Cholines, *Acetylcholine, *Cholinesterase inhibitors, In vivo analysis, In vitro analysis, Release, Parameters, Eye, Sizes(Dimensions)

DESCRIPTORS: (U) *Argon, *Photoionization, Photons, Threshold effects, Nuclear physics, Synchrotrons

IDENTIFIERS: (U) Cholinergic effects, PE81102F, WUAFOSR2312A3

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A4

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AD-A150 815

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DTIC REPORT BIBLIOGRAPHY

AD-A150 818 12/1

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) Iteration of Expansions - Unambiguous Semigroups.

SEP 84 57P

PERSONAL AUTHORS: Birget, J. E. ;

CONTRACT NO. DAAG29-81-K-0138, AFOSR-81-0238

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR,ARO
TR-85-0052, 18343.42-MA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Journal of Pure and Applied Algebra, n34 p1-55 (1984).

ABSTRACT: (U) New expansions for global semigroup theory are developed. Many expansions have a left and a right version, each with specific (dual) properties; e.g., the Rhodes expansion have unambiguous order. In applications one sometimes needs expansions having both properties simultaneously; these can be constructed by alternately applying the left and the right expansion (possibly infinitely often) while keeping the same set of generators. Thus one obtains an expansion which is invariant under application of the old two expansions and thus has the properties of both. It is proved that, in the case of the Rhodes expansion, the new expansion is close to the original semigroup.

DESCRIPTORS: (U) *Matrices(Mathematics), Random variables, Covariance, Expansion, Reprints

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A8

AD-A150 818

UNCLASSIFIED

SEARCH CONTROL NO. EVL05A

AD-A150 617 20/3 14/2

NEW MEXICO UNIV ALBUQUERQUE DEPT OF MATHEMATICS AND STATISTICS

(U) Final Report on Grant AFOSR-82-0277,

NOV 84 7P

PERSONAL AUTHORS: Coutsiias, E. ;

CONTRACT NO. AFOSR-82-0277

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-85-0067

UNCLASSIFIED REPORT

ABSTRACT: (U) During this period the investigator produced two papers entitled Effects of thermal spread on the space charge limit of an electron beam and Nonrelativistic Kapitza-Dirac scattering. Additional keywords: Air Force research. (Author).

DESCRIPTORS: (U) *Space charge, Grants, Air Force research, Limitations, Electron beams

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A4

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 819 11/4 20/11 14/2 AD-A150 819 CONTINUED

OXFORD UNIV (ENGLAND) DEPT OF ENGINEERING SCIENCE

(U) Behaviour of Fibre-Reinforced Composites under Dynamic Tension.

DESCRIPTIVE NOTE: Final rept. 30 Sep 82-14 Mar 84.

AUG 84 52P

PERSONAL AUTHORS: Saka, K.; Harding, J. ;

CONTRACT NO. AFOSR-82-0348

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR-85-0063

UNCLASSIFIED REPORT

ABSTRACT: (U) This British report describes a small gas gun, capable of accelerating a projectile 1m long by 25.4mm dia. to about 50m/s, and an extended split Hopkinson pressure bar apparatus which have been designed and constructed for the tensile impact testing of fibre-reinforced composite specimens at strain rates of the order of 1000/s. Commissioning tests have shown equilibrium in the specimen to be attained at an early stage in the test and the effects of stress wave reflections in the specimen grip regions on the calculated stress-strain response to be negligibly small. A technique has been developed for the preparation of low volume fraction 'model' hybrid specimens, unidirectionally reinforced with a single layer of fibre tows, alternately of glass and of carbon fibres. Specimens have also been prepared from commercially supplied carbon/glass and carbon/kevlar epoxy plates with different stacking sequences for the carbon and glass or carbon and kevlar reinforcing mats to allow specimens with a range of hybrid fractions. In initial impact tests on the 'model' specimens tensile failures were obtained but with a trend for fracture close to the specimen/loading bar interface rather than in the centre of the parallel gauge section. Even so, a marked increase in fracture strength with strain rate was observed. Initial tests have also been performed on the woven reinforced carbon/glass hybrid specimens and the effect of hybrid

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fraction on the tensile modulus, fracture strength and fracture strain under impact loading has been determined. A preliminary study of the failure processes using optical and scanning electron microscopy has been undertaken.

DESCRIPTORS: (U) *Fiber reinforced composites, *Tension, *Stress strain relations, Projectiles, Tensile properties, Epoxy compounds, Fracture (Mechanics), Mats, Electron microscopy, Gas guns, Strain rate, Stress waves, Impact tests

IDENTIFIERS: (U) Hybrid fraction, PE81102F, WUAFOSR2307B1

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 822 20/14 20/8

AD-A150 821 12/1

NEW MEXICO UNIV ALBUQUERQUE

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) Nonrelativistic Kapitza-Dirac Scattering.

(U) Optimal Designs for Comparisons between Two Sets of Treatments.

84 58P

PERSONAL AUTHORS: Coutslas, E. A.; McIver, J. K.;

DESCRIPTIVE NOTE: Technical rept.,

CONTRACT NO. AFOSR-82-0277

OCT 84 27P

MONITOR: AFOSR
TR-85-0088

PERSONAL AUTHORS: Majumdar, D.;

REPORT NO. TR-84-7

UNCLASSIFIED REPORT

CONTRACT NO. AFOSR-80-0170

ABSTRACT: (U) We use techniques of Singular Perturbation theory to investigate the scattering of nonrelativistic charged particles by a standing light wave (Kapitza-Dirac scattering). Unlike previous treatments, we give explicit results for the effects of the time dependent part of the field. For low field intensity/low particle energy we show that the leading order effects can be found from an averaged equation and we compute corrections. For the strong fields that can be produced by modern lasers and / or high particle energies we show that the time dependence of the potential leads to focusing. Our methods can be applied to other problems with time-periodic potentials.

DESCRIPTORS: (U) *Light scattering, *Standing waves, Charged particles, Energy, Lasers, Time dependence

IDENTIFIERS: (U) *Kapitza Dirac scattering

UNCLASSIFIED REPORT

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0008

ABSTRACT: (U) Suppose v treatments are to be compared in b blocks of size k each. Also suppose that the treatments are divided into 2 sets of u and $w = v - u$ treatments. A -optimal designs are obtained for estimating all the differences of two treatments, one from each set. Optimal row-column designs are also obtained. Some new optimal designs for comparing several treatments with a single control are obtained as special cases. Key words include: A -optimal designs, block designs, row-column designs, comparisons between two sets of treatments, control-treatment comparisons, several controls. (Author)

DESCRIPTORS: (U) *Set theory, Optimization, Control

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

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AD-A150 821

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 655 12/1

AD-A150 649 20/8 20/5

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

NEW MEXICO UNIV ALBUQUERQUE DEPT OF MATHEMATICS AND STATISTICS

(U) Weak Convergence of a Sequence of Queueing and Storage Processes to a Singular Diffusion.

(U) Nonrelativistic Kapitza-Dirac Scattering.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

NOV 84 18P

NOV 84 57P

PERSONAL AUTHORS: Rosenkrantz, W. A. ;

PERSONAL AUTHORS: Couttsias, E. A. ; McIver, J. K. ;

CONTRACT NO. AFOSR-82-0187

CONTRACT NO. AFOSR-82-0277

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A4

MONITOR: AFOSR
TR-85-0056MONITOR: AFOSR
TR-85-0088

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) It has been known for a long time that heavy traffic limit theorems in queueing theory are but a special case of the so-called diffusion approximation in Physics and Genetics. Take for example Kingman's (1982) heavy traffic approximation for the stationary waiting time distribution for a sequence of GI/GI/1 queues $Q(n, \sigma)$ depending on a parameter σ . Denote the waiting time, excluding service, or the n th customer by $W(n, \sigma)$ and let $U(n, \sigma) = S(n, \sigma) - T(n, \sigma)$ where $S(n, \sigma) =$ service time of the n th customer and $T(n, \sigma) =$ inter arrival time between the n th and $(n+1)$ st customer and assume $E(U(n, \sigma)) =$ variance of $U(n, \sigma) = \sigma^2$ and $\sigma^2 > 0$.

DESCRIPTORS: (U) *SEQUENCES(MATHEMATICS), *QUEUEING THEORY, TIME INTERVALS, GENETICS, PARAMETERS, DIFFUSION, STORAGE, WEAK CONVERGENCE, TRAFFIC, PHYSICS, DISTRIBUTION, TIME

IDENTIFIERS: (U) Heavy traffic limit theorems, Waiting time, Customers, PE81102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A150 661 CONTINUED

OKLAHOMA STATE UNIV STILLWATER OFFICE OF BUSINESS AND
ECONOMIC RESEARCH

(U) Some Recent Developments in Systems Reliability.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-30 Sep 84.

JAN 85 45P

PERSONAL AUTHORS: Locks, M. O. ;

REPORT NO. OSU-08ER-85-1

CONTRACT NO. AFOSR-82-0251

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0094

DESCRIPTORS: (U) *SYSTEMS ANALYSIS, *COMPUTATIONS, PATHS,
TABLES(DATA), RELIABILITY, GRAPHS, LOGIC, TOPOLOGY,
CONFIGURATIONS, FUNCTIONS(MATHEMATICS), TREES, CHARTS,
DIAGRAMS

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A5

UNCLASSIFIED REPORT

ABSTRACT: (U) System reliability analysis calculates the probability of success for a system, based on the component reliabilities and the configuration. First, a logic function is obtained in the form of either a tree, chart, graph, diagram or list of paths. From this logic function a probability formula is derived. The classical or conventional method of generating a formula is inclusion-exclusion (IE). With the past decade there have been some significant new developments that resulted in ways to estimate the system reliability that are more efficient than IE. Two of these techniques are discussed in this paper: sum of disjoint products (SDP), and the topological reliability (TR) of Satyanarayana and Prabhakar (S&P). This paper covers the theory and procedures of both techniques, shows their interrelationships with IE, and discusses complexity considerations and computer time needed for preparation of a system formula. The discussion on TR also includes advanced applications such as overall reliability and k-terminal reliability, classes of problems that can conveniently be solved by TR with minor modification of the logic. Originator key words include: System reliability; inclusion-exclusion; sum of disjoint products; topological reliability; m-out-of-n; source-to-multiple terminal reliability. (Author)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 863 20/3 20/9

AD-A150 863 CONTINUED

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Research on Thermionic Plasmas.

the loss of ionization energy (carried by the ions) to the emitter. Therefore these emitter sheath phenomena increase arcdrop. Within the limitations of the current thermionic converter formulation, all three of these phenomena (which become significant at low currents) steepen the current-voltage characteristic.

DESCRIPTIVE NOTE: Final rept. 15 Jan 83-30 Jun 84.

JUN 84 157P

PERSONAL AUTHORS: Main, G. L.; Lam, S. H. ;

DESCRIPTORS: (U) *EMITTERS, *PLASMAS(PHYSICS), *PLASMA SHEATHS, *THERMIONIC EMISSION, ELECTRON ENERGY, IONS, DENSITY, REFLECTION, DISTRIBUTION, THESES, STRUCTURAL PROPERTIES

REPORT NO. MAE-1862

CONTRACT NO. AFOSR-83-0048

IDENTIFIERS: (U) *Emitter sheath phenomena, Plasma density, Surface emission ions, PE61102F, WUAF0SR2301K2

PROJECT NO. 2301

TASK NO. K2

MONITOR: AFOSR
TR-85-0087

UNCLASSIFIED REPORT

ABSTRACT: (U) Emitter sheath phenomena are important in thermionic energy converters because the emitter sheath forms the boundary conditions for the plasma in the gap and controls both the ion loss rate and the loss rate of hot (3000 K) plasma electrons to the emitter. This thesis examines three expected emitter sheath phenomena and their effects on converter performance: (1) reflection of ions coming from the plasma; (2) ions trapped in the double emitter sheath; and (3) surface emission ions. Inclusion of these 3 phenomena combined with elimination of previous sheath approximations requires careful analysis and calculation of the sheath structure. It is shown that the 'Bohm' matching condition must be generalized to insure that self-consistency prevails throughout the entire sheath and not just at the plasma-sheath interface. It is also shown that plasma ion distribution coming into that sheath must have its low energy ions 'cut off' to produce a self-consistent collisionless sheath, and that each of these emitter sheath phenomena reduce the normalized (by plasma density) net loss rate to the emitter. Each of these phenomena also raises the normalized plasma density adjacent to the emitter. The higher plasma density at the emitter causes a greater increase in the loss of hot plasma electron energy to the emitter than the corresponding decrease in

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AD-A150 667 20/4 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A
AD-A150 667 CONTINUED

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF
AEROPHYSICS AND AEROSPACE ENGINEERING

(U) Transonic Merging Separated Flows.

DESCRIPTIVE NOTE: Final rept. 1 May 83-30 Apr 84.

JUL 84 99P

PERSONAL AUTHORS: Koenig, K. ;

CONTRACT NO. AFOSR-83-0179

PROJECT NO. 2307

TASK NO. 09

MONITOR: AFOSR
TR-85-0098

UNCLASSIFIED REPORT

ABSTRACT: (U) This study considers an arrangement of a plane-nosed circular cylinder with a smaller diameter plane-nosed cylindrical probe coaxially extending ahead in a transonic axial flow. This configuration is a prototype for a low drag forebody replacing more conventional streamlined nose fairings. Apparently only one previous study is available in open literature which clearly shows reductions in transonic forebody drag for such arrangements. In view of the lack of data on transonic flow past probe/cylinder configurations, an attempt is made to construct the flow field based on data for related and component flows. The flow is modelled as the merging of several component, separated flows. Component flows are axisymmetric plane-nosed cylinders and axisymmetric forward-facing steps. Related flows include rearward-facing steps, cavities and bases. Relatively little data are available in the open literature concerning transonic flow past any of these arrangements, especially for axisymmetric geometries. The data which is available is discussed for insights which might be gained regarding probe/cylinder flows; emphasis is given to a plane-nosed cylinder flows and the opening phenomenon associated with cavity flows. A simple, semi-empirical free streamline model is developed for the postulated flow field of a low-drag probe/cylinder configuration. Partial agreement with inferences from related experimental data is obtained.

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DESCRIPTORS: (U) *TRANSONIC FLOW, *FLOW SEPARATION,
COAXIAL CONFIGURATIONS, MATHEMATICAL MODELS, NOSES,
AXISYMMETRIC, FLOW FIELDS, CAVITIES, CYLINDRICAL BODIES,
LOW DRAG, PROBES, STREAMLINE SHAPE, AXIAL FLOW

IDENTIFIERS: (U) Low drag forebodies, Merging flow,
Forward facing steps, Rearward facing steps, Plane nosed
cylinder flow, Cavity flow, PEB1102F, WJAFOSR2307D9

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 874 20/12

ROCKWELL INTERNATIONAL THOUSAND OAKS CA
MICROELECTRONICS RESEARCH AND DEVELOPMENT CENTER

(U) AIN Insulator for III-V MIS Applications.

DESCRIPTIVE NOTE: Final rept. 1 Jul 82-30 Jun 84,

NOV 84 58P

PERSONAL AUTHORS: Elliott, K. R. ; Grant, R. W. ;

CONTRACT NO. F49620-82-C-0034

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR
TR-85-0091

UNCLASSIFIED REPORT

ABSTRACT: (U) The use of AIN as an insulator for GaAs MIS structures was investigated. The AIN films were prepared by reactive evaporation in an ultra-high vacuum system. Aluminum from a MBE source was reacted with NH₃ from an effusion cell on a heated GaAs substrate. Several material preparation variables were investigated which included choice of substrate, substrate surface preparation, growth temperature, Al/NH₃ flux ratio, and deposition rate. The optimum AIN film growth parameters in terms of morphology and adhesion were found to involve use of thermally cleaned GaAs substrates, a 500-550 C substrate growth temperature, an effective NH₃ partial pressure of 0.00005 to 0.00001 Torr at the GaAs surface, and a growth rate of about 100Å/min. The AIN prepared in this manner was stoichiometric, polycrystalline, had the hexagonal wurtzite structure, and had no detectable oxygen or carbon contamination as determined by x-ray diffraction. TEM far infrared transmission, and in situ Auger electron spectroscopy. The insulating properties of the AIN/GaAs MIS structures appeared to depend on preparation conditions. It was concluded from several studies that small amounts of undetectable residual oxygen contamination were most likely responsible for the observed variation in AIN conductivity. Complex C-V results were obtained for most AIN/GaAs MIS structures which most likely were influenced by large interface state densities, leakage, and charge storage effects. No

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definitive correlation between AIN/GaAs preparation parameters and interface state charge densities was obtained. Processes were developed to fabricate both gated diodes and MISFET's from AIN/GaAs samples.

DESCRIPTORS: (U) *INSULATION, *SEMICONDUCTORS, *ALUMINUM COMPOUNDS, *NITRIDES, ADHESION, AUGER ELECTRON SPECTROSCOPY, FILMS, GROWTH(GENERAL), PARAMETERS, ALUMINUM, CARBON, CONTAMINATION, DEPOSITION, RATES, ELECTRICAL PROPERTIES, GALLIUM ARSENIDES, DENSITY, INTERFACES, OXYGEN, PREPARATION, RESIDUALS, MORPHOLOGY, X RAY DIFFRACTION, SUBSTRATES, ULTRAHIGH VACUUM

IDENTIFIERS: (U) WUAFOSR2308B1, PEB1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A150 675 20/4 14/2

AD-A150 675 CONTINUED

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Advanced Diagnostics for Reacting Flows.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Oct 83-30 Sep 84.

DEC 84 69P

PERSONAL AUTHORS: Hanson, R. K. ;

CONTRACT NO. F49620-83-K-0004

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-85-0086

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Progress is reported for the fourth year of an interdisciplinary program to innovate modern diagnostic techniques applicable to reacting and plasma flows. Research topics include: 1) fiber optic absorption/fluorescence sensors employing tunable ultraviolet, visible and infrared laser sources for species measurements; 2) wavelength-modulation spectroscopy, using rapid-scanning ultraviolet, visible and infrared laser sources, for absorption and fluorescence measurements of species, temperature and absorption lineshapes; 3) quantitative flow visualization, including temporally and spatially resolved species and temperature measurements in a plane, using laser-induced fluorescence; 4) quantitative particle visualization in spray flames using Mie scattering; 5) multiple-point velocity visualization; 6) advanced solid-state camera/computer systems for high speed and high-resolution recording, processing and display of flow visualization data; 7) plasma diagnostics, utilizing planar laser-induced fluorescence and wavelength modulation techniques; 8) optical processing and phase conjugation studies; and 9) investigation of other new diagnostic concepts. Originator-supplied keywords include: Combustion; Flame; Diagnostics; Temperature; Infrared; Visible; Spectroscopy;

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Turbulent; Fluorescence; Fiberoptic; Sensor; Flow; Velocity; Species; Visualization.
DESCRIPTORS: (U) *FLOW, *DIAGNOSIS(GENERAL), *DIAGNOSTIC EQUIPMENT, ABSORPTION, SOLID STATE ELECTRONICS, FIBER OPTICS, INFRARED LASERS, PLASMAS(PHYSICS), MIE SCATTERING, OPTICAL PROCESSING, PLASMA DIAGNOSTICS, FLOW VISUALIZATION, COMBUSTION, TURBULENCE, VELOCITY, FLUORESCENCE, LASER INDUCED FLUORESCENCE, DETECTORS, SPECTROSCOPY, MEASUREMENT, TEMPERATURE, FREQUENCY MODULATION, MEASUREMENT, FLAMES

IDENTIFIERS: (U) WUAFOSR2308A3, PE61102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 695 20/5 20/6

AD-A150 689 11/9

OPTICAL SOCIETY OF AMERICA WASHINGTON D C

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Second Topical Meeting on Laser Techniques in the Extreme Ultraviolet.

(U) Polysilastyrene: Phenylmethylsilane-Dimethylsilane Copolymers as Precursors to Silicon Carbide.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-10 Jan 85.

83 8P

JAN 85 140P

PERSONAL AUTHORS: Quinn, J. W. ;
Yu, H. ; Sinclair, R. ;

PERSONAL AUTHORS: West, R. ; David, L. D. ; Djurorovich, P. I. ;

CONTRACT NO. AFOSR-84-0012

CONTRACT NO. AFOSR-78-3570

PROJECT NO. 2301

PROJECT NO. 2303

TASK NO. A1

TASK NO. B2

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0080

TR-85-0043

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the Topical Meeting on Laser Techniques in the Extreme Ultraviolet, Boulder, CO 5-7 Mar 84.

SUPPLEMENTARY NOTE: Pub. in Ceramic Bulletin, v62 n8 p899-903 1983.

ABSTRACT: (U) The topical meeting on Laser Techniques in the Extreme Ultraviolet dealt with the development of sources of high energy photons produced by direct lasing action, nonlinear mixing, and laser produced plasmas; basic research relevant to molecular physics; and selected novel applications such as holography and x-ray lithography. The conference also addressed novel spectroscopic techniques applicable in the extreme ultraviolet. Topics covered include: laser produced xuv radiation sources; high resolution and excited state spectroscopy; harmonic generation and frequency conversion; multiphoton excitation and ionization studies; laser-synchrotron experiments; soft x-ray lasers; anti-stokes Raman techniques; and xuv reflectors and optics. (Author).

DESCRIPTORS: (U) *LASER APPLICATIONS, *FAR ULTRAVIOLET RADIATION, RAMAN SPECTRA, HARMONIC GENERATORS, IONIZATION, LASERS, EXCITATION, PHOTONS, OPTICS, SPECTROSCOPY, FREQUENCY CONVERSION, HIGH ENERGY, HOLOGRAPHY, MOLECULAR PROPERTIES, SYNCHROTRONS, REFLECTORS, LITHOGRAPHY, X RAYS

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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AD-A150 582 CONTINUED

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Effects of Assuming Independent Component Failure Times, if They Actually Dependent, in a Series System.

understanding of the robustness of the analyses to departures from independent risks, an assumption commonly made by the methods currently in use.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 83-30 Sep 84.

DESCRIPTORS: (U) *Series(Mathematics). *Mathematical models. *Reliability, Computerized simulation, Failure, Mathematical analysis, Distribution, Parameters, Estimates, Graphics, Life tests, Multivariate analysis, Quadrants, Regression analysis

OCT 84 92P

PERSONAL AUTHORS: Moeschberger, M. L.; Klein, J. P.;

CONTRACT NO. AFOSR-82-0307

IDENTIFIERS: (U) Robustness, LPN-OSURF-763265/714837, PE61102F, WJAFOSR2304A5

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0001

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this proposal is to investigate the robustness to departures from independence of methods currently in use in reliability studies when competing failure modes or competing causes of failure associated with a single mode are present in a series system. The first specific aim is to examine the error one makes in modeling a series system by a model which assumes statistically independent component lifetimes when in fact the component lifetimes follow some multivariate distribution. The second specific aim is to assess the effects of the independence assumption error in estimating component parameters from life tests on series systems. In both cases, estimates of such errors will be determined via mathematical analysis and computer simulations for several prominent multivariate distributions. A graphical display of the errors for representative distributions will be made available to researchers who wish to assess the possible erroneous assumption of independent competing risks. A third aim is to tighten the bounds on estimates of component reliability when the risks belong to a general dependence class of distributions (for example, positive quadrant dependence, positive regression dependence, etc.). Major decisions involving reliability studies, based on competing risk methodology, have been made in the past and will continue to be made in the future. This study will provide the user of such techniques with a clearer

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AD-A150 577 7/3

AD-A150 577 CONTINUED

CINCINNATI UNIV OH DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE81102F, WUAFDSR2303A3

(U) Theoretical Investigations on Some Rigid-Rod Polymers
Used as High-Performance Materials.

FEB 84 10P

PERSONAL AUTHORS: Welsh, W. J. ; Bhaumik, D. ; Jaffe, H. H. ;
Mark, J. E. ;

CONTRACT NO. AFOSR-78-3683

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0035

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Engineering and
Science, v24 n3 p218-225 Feb 84.

ABSTRACT: (U) This review focuses on a new type of para-
catenated aromatic polymer being used in the preparation
of high-performance films and fibers of exceptional
strength, thermal stability, and environmental resistance,
including inertness to essentially all common solvents.
Polymers of this type include cis and transpoly(p-
phenylene benzosoxazole) (PBO), and the cis and trans
forms of the corresponding poly(p-phenylene
benzobisthiazole (PBT). The purpose of this paper is to
summarize the authors's theoretical work on the
structures, conformational energies, intermolecular
interactions, and electronic properties of PBO and PBT
chains, including the protonated forms known to exist in
strong acids. The emphasis is on how such studies provide
a molecular understanding of the unusual properties and
processing characteristics of this new class of materials.
Originator-supplied key words include: Rigid-rod polymers,
Liquid-crystalline polymers, Conformational analysis, PBT,
PBO, Electrical conductivity.

DESCRIPTORS: (U) *Azoles, *Synthetic fibers, *Films,
*Polymers, Electronics, Preparation, Theory, Solvents,
Electrical conductivity, Interactions, Molecule molecule
interactions, Processing, Thermal stability, Reprints

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A150 575

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AD-A150 575 CONTINUED

SAN DIEGO STATE UNIV CA DEPT OF CHEMISTRY

(U) The Kinetics and Mechanism of the Shock Induced Gas Phase Decomposition of Ethylsilane.

84

15P

Include: Kinetics, Mechanism, Ethylsilane, Ethylsilylene.

DESCRIPTORS: (U) *Reaction kinetics, *Silanes, *Ethyl radicals, Vapor phases, Reprints, Decomposition, Activation energy, Arrhenius equation, Shock tubes

IDENTIFIERS: (U) Ethylsilylene, PE61102F, WUAF05R230382

PERSONAL AUTHORS: Rickborn, S. F.; Ring, M. A.; O'Neal, H. E.

CONTRACT NO. AFOSR-83-0209, DE-FG02-80C583103

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0036

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Chemical Kinetics, v18 p1371-1383 1984.

ABSTRACT: (U) The decomposition kinetics of ethylsilane under shock tube conditions (P sub T approx. 3100 torr, T = 1080 approx. 1245 K), both in the absence and presence of silylene trapping agents (butadiene and acetylene) are reported. Arrhenius parameters under maximum butadiene inhibition are: $\log k(\text{C}_2\text{H}_5\text{SiH}_3) = 15.14 - 84,769 + \text{or} - 1433 \text{ cal}/2.303 \text{ RT}$; $\log k(\text{C}_2\text{H}_5\text{SiD}_3) = 15.29 - 88,208 + \text{or} - 1414/2.303 \text{ RT}$. The uninhibited reaction is subject to silylene induced decomposition (63% lowest T - 24% highest T). Major reaction products are ethylene and hydrogen, consistent with two dominant primary dissociation reactions: $\text{C}_2\text{H}_5\text{SiD}_3 \text{ yields } \text{C}_2\text{H}_5\text{SiD} + \text{D}_2$, Phi approx. 0.88; $\text{C}_2\text{H}_5\text{SiD}_3 \text{ yields } \text{CH}_3\text{CH} = \text{SiD}_2 + \text{HD}$, Phi approx. 0.30. Minor products suggest several other less important primary processes: alkane elimination, Phi approx. .02, and free-radical production via simple bond fission, Phi approx. .02. An upper limit for the activation energy of the decomposition, $\text{C}_2\text{H}_5\text{SiH}$ yields $\text{C}_2\text{H}_4 + \text{SiH}_2$, of E less than or = 30 + or - 4 kcal is established, and speculations on the mechanism of this decomposition (concerted or stepwise) with conclusions in favor of the stepwise path are made. Computer modeling studies for the reaction both in the absence and presence of butadiene are shown to be in good agreement with the experimental observations. Originator furnished keywords

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 573

20/1

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Stochastic Rearrangement Inequalities.

DESCRIPTIVE NOTE: Technical rept..

SEP 83

41P

PERSONAL AUTHORS: D'Abadie, C.; Proschan, F.;

REPORT NO. FSU-STATISTICS-M872, TR-83-187-AFOSR

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0007

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors develop a unified theory for obtaining stochastic rearrangement inequalities. The authors present sample applications in ranking problems, hypothesis testing, contamination models, optimal assembly of systems, and stochastic versions of well known rearrangement inequalities. Keywords include: hypothesis testing; partial ordering; total positivity; positive set function; arrangement increasing.

DESCRIPTORS: (U) *Stochastic control. Inequalities. Optimization. Hypotheses. Test methods

IDENTIFIERS: (U) PE61102F. WUAFOSR2304A5

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AD-A150 571

12/1

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) Arbitrary Versus Regular Semigroups.

84

81P

PERSONAL AUTHORS: Birget, J. C.;

CONTRACT NO. DAAG29-81-K-0138, AFOSR-81-0238

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, ARO
TR-85-0051, 18343.43-MA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Pure and Applied Algebra, v34 p57-115 1984.

ABSTRACT: (U) The notion of regularity for semigroups is studied, and it is shown that an unambiguous semigroup (i. e., whose L and R orders are respectively unions of disjoint trees) can be embedded in regular semigroup with the same subgroups and the same ideal structure (except that a zero is added to the regular semigroup). Previously it was shown that any semigroup is the homomorphic image of an unambiguous semigroup with the same groups and a similar ideal structure. Together these prove that an arbitrary semigroup divides a regular semigroup with a similar structure. The resulting regular semigroup is finite (resp. torsion, or bounded torsion) if the given semigroup has that property.

DESCRIPTORS: (U) *Groups(Mathematics). Reprints

IDENTIFIERS: (U) PE61102F. WUAFOSR2304A6

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AD-A150 585 11/4 20/11 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A
AD-A150 585 CONTINUED

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE
ENGINEERING

(U) Interlaminar Fracture Toughness in Resin Matrix
Composites.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Jan 83-14 Feb
84.

APR 84 88P

PERSONAL AUTHORS: Rehfield, L. W. ; Armanios, E. A. ; Reddy, A.
D. ;

CONTRACT NO. AFOSR-83-0058

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR
TR-85-0061

UNCLASSIFIED REPORT

ABSTRACT: (U) This annual report summarizes the objectives, accomplishments and proposed new directions of research on mode II interlaminar fracture in resin matrix composites. A mode II interlaminar fracture specimen, test and analysis method for interpreting results have been successfully developed and demonstrated for the AS4/3502 material system. Experimental data have been obtained under both net tensile and compressive loading. Of considerable importance are the findings that (1) the AS4/3502 material system shows increasing resistance to crack growth in tension, (2) interlaminar fracture under compression is a totally unstable process, and (3) tension and compression behaviors are considerably different. The findings and the conclusions that are drawn from them point to new, promising directions for the work. Two new central directions that are suggested involve failure analysis using fractography, radiography and ultrasonic inspection and the quantitative evaluation of mode I suppression technology utilizing the new testing method. Papers, reports and presentations resulting from this research are listed. Originator furnished keywords include: Delamination; Interlaminar fracture; Composite materials; Composite structures; Fracture testing; Mode II fracture; and

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DESCRIPTORS: (U) *Toughness, *Composite materials, *Fracture(Mechanics), Laminates, Fractography, Tensile properties, Test methods, Radiography, Composite structures, Compressive properties, Quantitative analysis, Matrix materials, Polymers, Crack propagation, Resistance, Ultrasonic tests

IDENTIFIERS: (U) WUAFOSR2307B2, PE81102F

IAC NO. NT-030802

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U)DELAMINATION, FRACTURE(MECHANICS), COMPOSITE MATERIALS, LAMINATES, INTERFACES, INTERNAL, RESINS, FAILURE ANALYSIS, FRACTOGRAPHY, RADIOGRAPHY, ULTRASONIC TESTING, TENSION, COMPRESSION, DESIGN;

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 580 15/5

AD-A150 553 11/10 7/1

CALIFORNIA UNIV LOS ANGELES SCHOOL OF ENGINEERING AND
APPLIED SCIENCE

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Sequential Decision Models in Reliability.

(U) Particle Sizes of Reinforcing Silica Precipitated into
Elastomeric Networks.

DESCRIPTIVE NOTE: Progress rept. 1 Oct 83-30 Sep 84.

84 5P

DEC 84 5P

PERSONAL AUTHORS: Miller, B. L. ; Jacobson, S. E. ;
Mortensen, R. E. ;PERSONAL AUTHORS: Ning, Y. P. ; Tang, M. Y. ; Jiang, C. Y. ;
Mark, J. E. ;

CONTRACT NO. AFOSR-82-0305

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2304

PROJECT NO. 2303

TASK NO. A5

TASK NO. A3

MONITOR: AFOSR
TR-85-0010MONITOR: AFOSR
TR-85-0033

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during this period was carried out in the areas of quality control, reliability in logistics support, and queueing theory applications to inventory. In addition, work from the previous year was completed in optimal inspection and optimal stockage policies for parts which replace failed components. The research was more varied than anticipated because Assistant Professor Subelman resigned unexpectedly to accept a position in industry and was replaced by Professor Jacobsen and Associate Professor Mortensen. This is a progress report on AFOSR Grant 82-0305.

DESCRIPTORS: (U) *Inventory, *Decision making, *Models, *Logistics support, Stockpiles, Quality control, Inspection, Optimization, Queueing theory, Policies, Reliability

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Polymer Science, v29 p3209-3212 1984.

ABSTRACT: (U) It has recently been demonstrated that it is possible to prepare very tough elastomers by swelling (Poly(dimethylsiloxane)PDMS networks with tetraethyl orthosilicate (TEOS) (C2H5O)4Si), which is then hydrolyzed in situ. It was proposed that the hydrolysis of the TEOS gives silica particles which provide the desired reinforcement. The present investigation tests these ideas by means of transmission electron micrographs obtained on thin slices of PDMS elastomers thus prepared. The main goals are to find evidence for such filler particles and, if present, to estimate their sizes and size distribution. Since any such particles would be formed within a polymer matrix which should impede their coalescence into undesired aggregates, the degree of dispersion of the filler particles is also of considerable interest. Originator furnished keywords include: Silica particles, Elastomer reinforcement, In-situ precipitation, Electron microscopy, and Filled networks.

DESCRIPTORS: (U) *Chemical precipitation, *Elastomers, *Silicon dioxide, *Hydrolysis, Distribution, Electron microscopy, Reprints, Electron microscopy, Fillers, Particle size, Reinforcing materials

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 552 11/10 7/1

AD-A150 551 11/9 20/3

CINCINNATI UNIV OH DEPT OF CHEMISTRY

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Treatment of Filler-Reinforced Silicone Elastomers to Maximize Increases in Ultimate Strength.

84 6P

84 3P

PERSONAL AUTHORS: Ning, Y. P.; Mark, J. E. ;

PERSONAL AUTHORS: Riande, E.; Mark, J. E. ;

CONTRACT NO. AFOSR-83-0027

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A3

TASK NO. A3

MONITOR: AFOSR
TR-85-0032MONITOR: AFOSR
TR-85-0034

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Bulletin, v12 p407-411 1984.

SUPPLEMENTARY NOTE: Pub. in European Polymer Jnl., v20 n5 p517-518 1984.

ABSTRACT: (U) Model elastomers prepared by end linking poly(dimethylsiloxane) chains were filled in-situ by the ethylamine-catalyzed hydrolysis of tetraethylorthosilicate. The increases in modulus and ultimate strength obtained from the presence of filler were enhanced by a swelling-extraction treatment of the elastomers with tetrahydrofuran. The effect may be due to hydrolytic formation of additional particle surface silanol groups or removal of adsorbed small molecules, thereby increasing the number of sites for particle-polymer bonding. Originator furnished keywords include: Filled elastomers, Reinforced elastomers, In-situ precipitation, Silica particles, Model networks, and Particle surface treatment.

DESCRIPTORS: (U) *Chemical precipitation, *Elastomers, *Hydrolysis, *Silicon dioxide, Fillers, Surface finishing, Modulus of elasticity, Strength(Mechanics), Reprints, Reinforcing materials, Furans, Hydroxyl radicals

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3

DESCRIPTORS: (U) *Polymers, *Siloxanes, *Dipole moments, Cyclic compounds, Polarization, Reprints, Constants, Dielectric properties

IDENTIFIERS: (U) Polydimethylsiloxane, PE81102F, WUAFOSR2303A3

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 549

12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Skewed Stable Variables and Processes.

DESCRIPTIVE NOTE: Technical rept..

SEP 84

28P

PERSONAL AUTHORS: Hardin, C. D., Jr;

REPORT NO. TR-79

CONTRACT NO. F49820-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-84-1273

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider here general (i.e. possibly skewed or asymmetric) stable distribution and processes. A decomposition result and a moment equality are given for these distributions. More importantly, we determine the form of all stable independent increments processes, construct a Wiener-type stochastic integral with respect to these processes, and prove a representation theorem for general stable processes analogous to (and in some sense including) the spectral representation theorem for symmetric stable processes. (Author)

DESCRIPTORS: (U) *Statistical distributions. Random variables, Theorems, Skewness, Stability

IDENTIFIERS: (U) PEB1102F, WUAFDSR2304A5

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AD-A150 535 7/4 20/9

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Evaluation of Atomic Fluorescence Detection Limits with an Inductively Coupled Plasma as an Excitation Source and Atomization Cell.

84

7P

PERSONAL AUTHORS: Long, G. L.; Winefordner, J. D.;

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-85-0037

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Spectroscopy, v38 n4 p563-567 1984.

ABSTRACT: (U) The use of an inductively coupled plasma ICP, as an excitation source for atomic fluorescence spectrometric, AFS, in a second ICP is re-examined. Improvements in the ICP-ICP-AFS setup have allowed the lowering of the limits of detection by one to two orders of magnitude below that of previous work. Also discussed is a new mode of operation for the atomization cell ICP. Through simple torch-position and flow-rate adjustments, a thin plasma, which extends 20 to 30 cm above the torch can be produced. This plasma is referred to as the pencil plasma. With the use of these operating conditions, propane can be added to the Ar nebulizing gas to aid in refractory-element determination. The pencil plasma and the conventional plasma will be compared for use as an atom reservoir for AFS measurements.

DESCRIPTORS: (U) *Atomic spectroscopy, *Plasmas(Physics), Fluorescence, Refractory materials, Refractory materials, Reprints, Atoms, Pencil beams, Atomization, Cells, Coupling(Interaction), Excitation

IDENTIFIERS: (U) PEB1102F, WUAFDSR2303A1

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 534 7/2

AD-A150 533 21/5 20/4

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE LAB

(U) Use of Active Nitrogen in Analytical Chemiluminescence Spectrometry.

84 7P

DESCRIPTIVE NOTE: Final rept. 1 Oct 81-30 Sep 84.

DEC 84 55P

PERSONAL AUTHORS: Jurgensen, H.; Winefordner, J. D.;

PERSONAL AUTHORS: Greitzer, E. M.; Kerrebrock, J. L.;
Thompkins, W. T.; McCune, J. E.; Epstein, A. H.;

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

CONTRACT NO. F49620-82-K-0002

TASK NO. A1

PROJECT NO. 2301

MONITOR: AFOSR
TR-0038

TASK NO. A4

MONITOR: AFOSR
TR-85-0016

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Talanta, v31 n10A p777-782
1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) Methods of obtaining active nitrogen plasmas at both reduced and atmospheric pressures are described. The mechanism of energy transfer from the excited states of nitrogen to metal atoms and to organic molecules and the subsequent emission of characteristic radiation is outlined. The application of these processes to the detection and determination of traces of metals and organic compounds is discussed and recent work on gas chromatographic detectors, based on these systems, is reviewed.

DESCRIPTORS: (U) *Nitrogen, *Chemiluminescence,
*Spectrometry, Reprints, Atoms, Organic compounds,
Plasmas(Physics), Energy transfer, Molecules

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A1

ABSTRACT: (U) A multi-investigator program on problems of current interest in turbomachinery fluid dynamics is being conducted at the MIT Gas Turbine Laboratory. Within the scope of this effort, four different tasks, encompassing both design and off design programs, have been identified. These are: (1) Investigation of fan and compressor design point fluid dynamics (including formation of design procedures using current 3-D transonic codes and development of advanced measurement techniques for use in transonic fans); (2) Studies of basic mechanisms of compressor stability enhancement using compressor casing/hub treatment; (3) Fluid mechanisms of inlet vortex flow distortions in the gas turbine engines; (4) Investigations of 3-D analytical and numerical computations of flows in highly loaded turbo-machinery blading.

DESCRIPTORS: (U) *Engines, *Gas turbines,
*Turbomachinery, Measurement, Methodology, Augmentation,
Compressors, Stability, Distortion, Inlets, Vortices,
Fluid dynamics, Blades

IDENTIFIERS: (U) PE61102F, WJAFOSR2301A4

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 513 20/10 9/2

AD-A150 513 CONTINUED

KMS FUSION INC ANN ARBOR MI

(U) Parallel Processing for Computational Continuum Dynamics.

DESCRIPTORS: (U) *Continuum mechanics, *Computations, *Parallel processing, Digital computers, Dynamics, Rates, Finite difference theory

JAN 85 23P

IDENTIFIERS: (U) HEP(Heterogeneous Element Processors), H1000 computers, Lagrangian theory, Eulerian theory, PEB1102F, WUAFOSR3005A1

PERSONAL AUTHORS: McGrath, J. F.; Hicks, D. L.; Liebrock, L. M.;

REPORT NO. KMSF-U1538

CONTRACT NO. F49820-84-C-0111

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-85-0045

UNCLASSIFIED REPORT

ABSTRACT: (U) The numerical solution of many problems in continuum dynamics is seriously limited by the computation rates attainable on computers with serial architecture. Parallel processing machines can achieve much higher rates. However, applying additional processors to a calculation is only part of the solution. In this report, parallel algorithms are developed for explicit and implicit, Lagrangian and Eulerian finite difference schemes for computational continuum dynamics in one spatial dimension. First, the explicit conservation equations in the Lagrangian reference frame are readily reformulated for concurrent processing. Second, and implicit solution is derived for these equations. This is important because it yields unconditional stability. The parallelism is achieved via a block implicit numerical scheme. Third, a rezoning algorithm is employed with each Lagrangian integration step to transform the mesh back to the Eulerian reference frame. Along the algorithmic development path, a zone-by-zone parallelization gives way to a block-by-block technique both of which are self-scheduling. Then the latter is compared to an approach that keeps the parallel processes alive for many time steps. At each step of this research exploiting the architectural advantages of the HEP H1000 (Heterogeneous Element Processor) computer. (Author)

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AD-A150 512 CONTINUED

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Robust Feedforward/Feedback Control Logic for a Target-Tracking Mechanical Arm.

DESCRIPTIVE NOTE: Semi-annual rept. 30 Sep 83-30 Mar 84.

MAR 84 74P

PERSONAL AUTHORS: Cannon, R. H., Jr.; Gardner, B. E. ;

REPORT NO. SUDAAR-537

CONTRACT NO. F49620-82-C-0092

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-84-1277

UNCLASSIFIED REPORT

ABSTRACT: (U) An analytic design study is conducted to demonstrate circumstances under which the inclusion of feedforward compensation in a target-tracking control scheme can be expected to offer significant performance gain. In particular, a target-tracking controller design problem for a mechanical arm is developed to assess quantitatively the capacity of feedforward to provide a quicker, more accurate tracking response over wide ranges of uncertainty or variability in the dynamic parameters of both plant and target. The Stanford Aeronautics and Astronautics Department Robotics Lab two-link, two-actuator mechanical arm, inherently a system with variable kinematic and dynamic parameters, provides an appropriate framework for this study. Using recent developments in the theory of quadratic synthesis of robust, low-order optimal controllers, control logic is developed - both with and without feedforward - that enables the arm end point to track a physical target characterized in part by periodic motion of variables or uncertain frequency and phase. It is shown that, using relatively noise-free measurements of target position coordinates only, feedforward compensation can be expected to provide substantial reductions in tracking errors for given constraints on control effort, particularly when the range of variation in target

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AD-A150 511 CONTINUED

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN
OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A5

(U) A Monte Carlo Sampling Plan for Estimating Network
Reliability.

DESCRIPTIVE NOTE: Technical rept..

OCT 84 49P

PERSONAL AUTHORS: Fishman, G. S. ;

REPORT NO. UNC/ORSA/TR-84/8

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0046

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper presents a relatively complete and comprehensive description of a general class of Monte Carlo sampling plans for estimating $g = g(s, T)$, the probability that s is connected to all nodes in T . The paper also provides procedures for implementing these plans. Each plan uses known lower and upper bounds B, A on g to produce an estimator of g that has a smaller variance $(A-g)(g-B)/K$ than one obtains for crude Monte Carlo sampling ($B=0, A=1$) on K independent replications. The paper describes worst case bounds on sample sizes K , in terms of B and A , for meeting absolute and relative error criteria. It also gives the worst case bound on the amount of variance reduction that can be expected when compared with crude Monte Carlo sampling. An example illustrates the variance reductions achievable with these plans. The paper next shows how to assess the credibility that a specified error criterion for g is met as the Monte Carlo experiment progresses and then shows how confidence intervals can be computed for g . Originator-supplied keywords include: Monte Carlo methods, Network reliability, Variance reduction.

DESCRIPTORS: (U) *Electrical networks, *Sampling, Monte Carlo method, Planning

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Informative Geometry of Probability Spaces.

(U) Bootstrapping the Kalman Filter.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

DEC 84 59P

DEC 84 27P

PERSONAL AUTHORS: Burbea, J. ;

PERSONAL AUTHORS: Stoffer, D. S. ;

REPORT NO. TR-84-52

REPORT NO. TR-84-51

CONTRACT NO. F49820-85-C-0008

CONTRACT NO. F49620-82-K-0001

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-85-0015MONITOR: AFOSR
TR-85-0014

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ABSTRACT: (U) This paper is concerned with the geometrical properties that are induced by the local information contents and structures of the parameter space of probability distributions. Of particular interest in this investigation is the Rao distance which is the geodesic distance induced by the differential metric associated with the Fisher information matrix of the parameter space. Moreover, following Efron, David and Amari, some affine connections are introduced into the informative geometry of parameter space and thereby elucidating the role of the curvature in statistical studies. In addition, closed form expressions of the Rao distances for certain families of probability distributions are given and discussed. (Author).

DESCRIPTORS: (U) *Geometry, Geodesics, Probability distribution functions

DESCRIPTORS: (U) *Kalman filtering, Statistical samples, Forecasting, Normality

IDENTIFIERS: (U) Probability space, PE61102F, WUAFOSR2304A5

IDENTIFIERS: (U) Bootstrapping, Robustness, PE61102F, WUAFOSR2304A5

IAC NO. GC-850189

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)Kalman filters, Forecasting, Robustness, Smoothing, Parameters, Gaussian filters, Gaussian noise, Models, Filters, Estimates, Statistical analysis.;

AD-A150 510

AD-A150 509

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A150 502 CONTINUED

Multiprocessors.

DESCRIPTORS: (U) *Hierarchies, *Multiprocessors, Processing equipment, Configurations, Digital computers, Arrays

IDENTIFIERS: (U) Tree structured computing, Divide and conquer tree synthesis, PE81102F, WUAFOSR2304A2

AD-A150 502 9/2

KESTREL INST PALO ALTO CA

(U) Synthesis of Tree-Structured Computing Systems through Use of Closures

DESCRIPTIVE NOTE Final technical rept. 1 Oct 83-30 Aug 84

NOV 84 45P

PERSONAL AUTHORS King, R. ;

REPORT NO KES U-84-B

CONTRACT NO F49620-82-C-0007

PROJECT NO 2304

TASK NO A2

MONITOR AFOSR
TR 85 0065

UNCLASSIFIED REPORT

ABSTRACT (U) During this past year we have concerned ourselves with the synthesis of tree structures. These structures offer in our opinion, the best hope of achieving subpolynomial running times for typical problems without a degree of interconnection that makes physical implementation difficult. One would like to be able to synthesize trees using divide & conquer. Divide & conquer is an appealing technique for tree synthesis because of the isomorphism between the shape of the desired synthesized system and the recursive descent implicit in divide & conquer. Additionally, the technique makes good use of theorem proving techniques which are rapidly being developed for other purposes. Certain problems arise, however, when one tries to use divide & conquer to synthesize a tree-structured computing system. The basic difficulty is that nodes that are high in the tree are required to either compute or communicate large amounts of data. Our primary solution to this problem is to replace the original specification, which in general declares the existence of an output array that depends on various elements of the input array, into an equivalent specification, which declares the existence of a certain closure, or specialized functional object, together with a declaration that it be applied. Additional keyword:

AD A150 502

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AD-A158 954

AFOSR TECHNICAL REPORT SUMMARIES SECOND QUARTER CY 1985
(U) AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB
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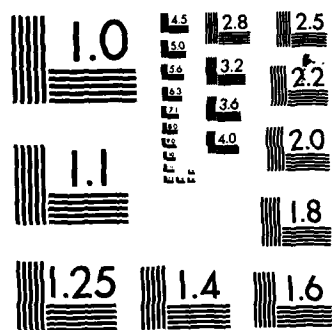
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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 497 12/1 9/2

AD-A150 491 20/12

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION
RESEARCH

GEORGE WASHINGTON UNIV WASHINGTON D C DEPT OF CIVIL
MECHANICAL AND ENVIRONMENTAL ENGINEERING

(U) Parallel Update of Minimum Spanning Trees in
Logarithmic Time.

(U) Evaluation and Development of Constitutive Relations
for Inelastic Behavior.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 80-31 Jan
83,

NOV 84 19P

DEC 83 338P

PERSONAL AUTHORS: Ramakrishnan, I. V. ; Pavagi, S. ;

PERSONAL AUTHORS: Eftis, J. ; Jones, D. L. ;

REPORT NO. CAR-TR-97, CS-TR-1452

REPORT NO. GMU/CMEE/TR-83/1

CONTRACT NO. F49620-83-C-0082, N00014-84-K-0530

CONTRACT NO. AFOSR-81-0241, AFOSR-80-0096

PROJECT NO. 2304

PROJECT NO. 2307

TASK NO. A7

TASK NO. B2

MONITOR: AFOSR
TR-85-0069

MONITOR: AFOSR
TR-85-0018

UNCLASSIFIED REPORT

ABSTRACT: (U) Parallel algorithms are presented for updating a minimum spanning tree when the cost of an edge changes or when a new node is inserted in the underlying graph. The machine model used is a parallel random access machine which allows simultaneous reads but prohibits simultaneous writes into the same memory location. The algorithms described in this paper for updating a minimum spanning tree require $O(\log n)$ time and $O(n^2)$ processors. These algorithms are efficient when compared to previously known algorithms for initial construction of a minimum spanning tree that require $O(\log n)$ to the base 2) time and use $O(n^2)$ processors.

DESCRIPTORS: (U) *Algorithms, Random access computer storage, Logarithm functions, Memory devices, Parallel processing

IDENTIFIERS: (U) WUAFOSR2304A7, PE81102F

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UNCLASSIFIED REPORT

ABSTRACT: (U) A review and critical assessment of the major theoretical developments in plastic and viscoplastic constitutive theory, as well as a brief survey of recent related experimental and computational advances is given. The very large number of thermoplastic and thermoviscoplastic theories that are currently being proposed stems largely from the presently unsettled state of the underlying theory of nonequilibrium thermodynamics, and also from the ambiguity that surrounds the added use of the internal state variable formalism as a theoretical tool in constitutive theory formulation. The use of the generalized continua, that is, continua with different formally defined internal structure as background for constitutive theory development does not, after approximately thirty years of activity, appear to have been fruitful, and seems to hold little promise for future useful applications. The advances that have occurred in experimental equipment and techniques, including the development of computer-controlled servohydraulic testing systems and various new areas of experimentation, are also reviewed. These areas include the measurement of initial and subsequent yield surfaces, time and temperature effects, strain rate effects, cyclic

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SEARCH CONTROL NO. EVL05A

AD-A150 491 CONTINUED

loading and finite strain considerations. The dramatic advances in computational capabilities and in techniques necessary to use computers in solving practical problems are also reviewed. Originator furnished key words include: Constitutive Equations, Plasticity, Viscoplasticity.

DESCRIPTORS: (U) *Elastic properties, *Plastic property, *Viscoplastic properties, Thermoplastic resins, Measurement, Computations, Internal, Computers, Temperature, Nonequilibrium flow, Theory, Thermodynamics

IDENTIFIERS: (U) Constitutive equations, WJAFOSR2307B2, PEB1102F

AD-A150 490 9/1 9/3

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Visible-Millimeter Solid State Research.

DESCRIPTIVE NOTE: Interim rept. Jan 83-Jun 84.

SEP 84 10P

PERSONAL AUTHORS: Fetterman, H. R. ;

CONTRACT NO. F49620-83-K-0016

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-84-1280

UNCLASSIFIED REPORT

ABSTRACT: (U) A Visible - Millimeter Wave mixing system has been set up with all components operating satisfactory and locked to stabilized cavities. Using this system, mixing has been obtained in semiconductor devices with frequency separations ranging up to 100 GHz... in a number of GaAs and GaAs/AlGaAs devices. These devices include commercial FETs, state of the art industrial FETs, HEMT structures fabricated as part of this program and Heterojunction bi-polar transistors supplied by local industry on a collaborative basis. Many of the initial goals of the first and second stages of this program have been achieved or are well underway. For example, mixing in short gate length FETs has been used to injection lock oscillators at frequencies up to 20 GHz. The mixing in HEMTs structure has proved to be extremely interesting when studied as a function of temperature. Improvements in transconductance as a result of increased carrier mobility are reflected in the mixing efficiencies. Finally these experiments have been extended to heterojunction bi-polar transistors showing that these devices have extremely fast response times limited by circuit parasitics. In the current phase of this program, devices specifically tailored to these experiments are being designed and tested. The goal is to obtain wideband width control of HEMT, and other novel three terminal layered, oscillators using fiber optics for efficient injection locking at millimeter wave frequencies. (Author)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 490 CONTINUED

AD-A150 489 7/5 20/12 20/5

DESCRIPTORS: (U) *Solid state electronics, *Millimeter waves, *Semiconductor devices, Gallium arsenides, Field effect transistors, Locking(Electronics), Injection, Visibility, Fiber optics, Bipolar systems, Heterojunctions, Transistors, Carrier mobility, Mixing, Oscillators, Transconductance, Gates(Circuits), Broadband

IDENTIFIERS: (U) WJAFDSR2301A1, PEB1102F

ILLINOIS UNIV AT URBANA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Non-Linear Optical Techniques for Visible and UV Lasers and Thin Film Deposition.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 83-30 Sep 84.

NOV 84 15P

PERSONAL AUTHORS: Eden, J. G. ;

CONTRACT NO. F49620-83-C-0003

MONITOR: AFOSR
TR-84-1263

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments are described in which lasers are used to generate specific Column IIIA metal ions. The first studies involved ion pair production in the metal-halide molecules (such as thallium iodide) by illuminating the vapor with 193 nm radiation. More recent experiments have succeeded in producing Al(+) ions by the multiphoton ionization (MPI) of metal alkyls (such as trimethylaluminum) in the visible. Another aspect of the current work is focusing on the use of ultraviolet radiation to enhance the growth rate of semiconductor films grown near pyrolytic threshold. The use of gaseous sensitizers (such as ammonia) to improve film growth rates and quality is also being explored. Finally, a simple photochemical means for improving the efficiency of a commercial XeCl laser by more than 50% has also been discovered. Originator furnished keywords include: Laser; Ultraviolet; Visible; Semiconductor films; Metal films; Excimer laser; Multiphoton ionization.

DESCRIPTORS: (U) *Photoionization, *Laser applications, *Semiconducting films, Visible spectra, Growth(General), Pair production, Lasers, Ions, Metals, Excimers, Metal films, Halides, Deposition, Thin films, Ultraviolet lasers

IDENTIFIERS: (U) Multiphoton ionization

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 476

12/1

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Automatic Symbolic Solution of Markov Chains.

DESCRIPTIVE NOTE: Technical rept..

84

22P

PERSONAL AUTHORS: Marle, R. ; Reibman, A. ; Trivedi, K. ;

REPORT NO. CS-1984-23

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0012

UNCLASSIFIED REPORT

ABSTRACT: (U) Continuous time Markov chains are commonly used in system performance modeling. Increasing system complexity and non-Markovian behavior can drastically increase the size of a Markov model's state space. Accordingly, approximation techniques have been introduced to reduce the resources needed to solve Markov chain models. In this paper the authors discuss a method for automatically deriving symbolic solutions of Markov chains. Symbolic solutions should provide insight when attempting to evaluate the validity of both Markov models and approximation techniques for their solution. (Author).

DESCRIPTORS: (U) *Markov processes, Mathematical models, Symbols, Solutions(General). Systems analysis

IDENTIFIERS: (U) WUAFOSR2304A5, PEB1102F

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AD-A150 475

7/2

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Structure, Bonding, and Internal Rotation in H₃PO, H₂POH, and HFPOH,

84

9P

PERSONAL AUTHORS: Schmidt, M. W. ; Yabushita, S. ; Gordon, M. S. ;

CONTRACT NO. AFOSR-82-0190

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0040

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v88 n3 p382-389 1984.

ABSTRACT: (U) The fundamental nature of the PO bond is reexamined by using ab initio (3-21G* and 6-31G*) wave functions and energy-localized orbitals. The bond is best described as a dative single bond augmented by pi back-donation from the oxygen lone pairs. The isomerization pathway from H₃PO to H₂POH is followed by using the intrinsic reaction coordinate and localized orbitals. The latter, more stable, isomer has two forms, cis and trans, which are nearly equal in energy. The internal rotation barriers in this molecule and in HFPOH are examined with a Fourier analysis and compared with their nitrogen analogues. The major differences between the potential curves in phosphorus and nitrogen species are attributed to different dipole-dipole (DD) interactions between the HX and OH moieties. Originator furnished keywords include: ab initio; PO bond; Energy-localized orbitals; Internal rotation barriers.

DESCRIPTORS: (U) *Chemical bonds, *Phosphorus, *Oxygen, Hydroxyl radicals, Hafnium, Hydrogen, Molecular orbitals, Molecular rotation, Reprints, Barriers, Internal, Isomerization

IDENTIFIERS: (U) WUAFOSR2303B2, PEB1102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 473

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WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

- (U) On the Thermal Interconversion of Matrix-Isolated Dimethylsilylene and 2-Silapropene. Their Reactions with Oxygen Atom Donors.

83

3P

PERSONAL AUTHORS: Arrington, C. A.; West, R.; Michl, J.;

CONTRACT NO. AFOSR-82-0067, NSF-CHE78-27094

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0042

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v105 p8176-8177 1983. Sponsored in part by Grant NSF-CHE80-00258.

ABSTRACT: (U) Generation of dimethylsilylene by photolysis of $(Me_2Si)_6$ in argon matrix at 15K in the presence of N_2O produces a new species believed to be dimethylsilylanone, Me_2Si-O double bond. The same species is produced from $Me_2SiH-CH_2$ double bond in the presence of N_2O . Originator furnished keywords include: organosilanes; silanones; photo rearrangement; silicon-oxygen double bond.

DESCRIPTORS: (U) *Photolysis, *Organic compounds, *Silanes, Nitrous oxide, Chemical bonds, Reprints, Atoms, Oxygen

IDENTIFIERS: (U) Dimethylsilylene, Silapropenes, Silanones, WUAFOSR2303B2, PE61102F

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8/13

CALIFORNIA UNIV DAVIS DEPT OF CIVIL ENGINEERING

- (U) In Situ Characterization of Soils for Prediction of Stress-Strain Relationship.

DESCRIPTIVE NOTE: Final rept. Nov 82-Nov 83,

NOV 83

121P

PERSONAL AUTHORS: Arulanandan, K.; Dafalias, Y.; Herrmann, L. R.; Anandarajah, A.; Meegoda, N.;

CONTRACT NO. AFOSR-81-0216

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0017

UNCLASSIFIED REPORT

ABSTRACT: (U) A non-destructive method of characterizing particulate systems using electrical properties is presented. The application of this methodology for the demarkation of cohesive and granular soils is demonstrated. The significance of this approach is that electrical properties of soils such as conductivity, sigma, and dielectric constant, epsilon, as a function of frequency, can be measured in situ. These properties, when suitably interpreted, can be used to quantify the structure of particulate systems including the inter and intra cluster void ratios. These structural properties can then be correlated with mechanical properties such as k sub o, lambda, k and M. Incorporating these mechanical properties into a bounding surface plasticity model, the in situ stress state and in situ stress strain behavior could be predicted. Application of this method to mixed soils is demonstrated in this report. This approach therefore provides a non-destructive method of characterization soils for the prediction of mechanical behavior.

DESCRIPTORS: (U) *Soils, *Nondestructive testing, Constants, Dielectric properties, Electrical properties, Mechanical properties, Predictions, Stress strain relations, Mixtures, Models, Plastic properties

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

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AD-A150 480 7/4

IDENTIFIERS: (U) WJAFOSR2307C1, PE81102F

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

IAC NO: NT-030801

(U) Ab Initio Studies of HXYP0 and XYP0H Molecules,

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

84 5P

IAC SUBJECT TERMS: N--(U)IN SITU, SOILS, STRESSES, CHARACTERIZATION, ELECTRICAL PROPERTIES, MECHANICAL PROPERTIES, DIELECTRIC CONSTANTS, ELECTRIC POTENTIAL PARTICLES, FREQUENCY, STRAIN(MECHANICS), PREDICTIONS;

PERSONAL AUTHORS: Gordon, M. S. ; Boatz, J. A. ; Schmidt, M. W.

CONTRACT NO. AFOSR-82-0190

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0041

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v88 n14 p2998-3002 1984.

ABSTRACT: (U) Molecular orbital calculations have been carried out on a sequence of HXYP0H molecules with X and Y = H, CH, NH2, OH, DCH3, and F. The molecular structures are predicted with the STO-2G* basis set. For the prediction of energies of isomerization to XYP0H species single-point 3-21G* and 6-31G* calculations were used. The molecular dissociation energies of HXYP0 to HOP + XY and to XP0 + HY were calculated by augmenting the latter two basis sets with MP2 and MP3 perturbation corrections. Originator furnished keywords include: Molecular orbital calculations, HXYP0H, STO-2G*.

DESCRIPTORS: (U) *Chemical bonds, *Phosphorus, *Oxygen, *Molecular orbitals, Computations, Energetic properties, Isomerization, Molecules, Chemical dissociation, Energy, Molecular states, Molecular structure, Reprints

IDENTIFIERS: (U) WJAFOSR2303B2, PE81102F

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AD-A150 429 10/2 1/3

AD-A150 429 CONTINUED

CLARKSON COLL OF TECHNOLOGY POTSDAM NY DEPT OF
ELECTRICAL AND COMPUTER ENGINEERING

(U) Control of Cascaded Induction Generator Systems.
IDENTIFIERS: (U) *CDFM(Cascaded Doubly Fed Machines).
*Cascaded doubly fed machines. *Variable speed constant
frequency generators. WUAFOSR230509, PE81102F

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 83-30 Aug
84.

DEC 84 63P

PERSONAL AUTHORS: Ortmeyer, T. H. ;

CONTRACT NO. AFOSR-83-0268

PROJECT NO. 2305

TASK NO. 09

MONITOR: AFOSR
TR-84-1259

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) This report documents an investigation of the stability and control of cascaded doubly fed machines (CDFM). These machines are brushless variable speed constant frequency electric power generators with potential for application in aircraft. A previous analytical study indicated the CDFM system would be controllable in the subsynchronous operating mode with a passive RL load. The present study contains two steps. First is an investigation of the machine operation in the supersynchronous mode. The second step is an investigation of machine operation with output capacitors providing excitation VARs for the machine and load. Step 1 results show that the machines exhibit stability characteristics in the supersynchronous mode similar to those observed in the subsynchronous mode. Step 2 results show that output capacitors degrade the system performance, particularly at light loads. The results show that output current feedback can be employed to improve the system performance.

DESCRIPTORS: (U) *Electric generators.
Synchronization(Electronics), Brushless electric
equipment, Aircraft equipment, Stability, Capacitors,
Output

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SEARCH CONTROL NO. EVLO5A

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CINCINNATI UNIV OH DEPT OF CHEMISTRY

7/4

AD-A150 408

11/10

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) The Effect of Relative Humidity on the Hydrolytic Precipitation of Silica into an Elastomeric Network.

84

4P

PERSONAL AUTHORS: Jiang, C. Y.; Mark, J. E.;

CONTRACT NO. AFOSR-83-0027, NSF-DMR79-18903

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0028

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Colloid & Polymer Science, v282 p758-760 1984.

ABSTRACT: (U) Results are presented showing the effect of relative humidity on the amount of reinforcing silica precipitated into an elastomeric network. Mechanical properties are used to show the extent of the reinforcement obtained. Originator furnished keywords include: Filled elastomers, Silica filler, In situ reinforcement and Poly(dimethylsiloxane).

DESCRIPTORS: (U) *Chemical precipitation, *Elastomers, *Hydrolysis, *Silicon dioxide, Reprints, Reinforcing materials, Fillers, Mechanical properties, Humidity

IDENTIFIERS: (U) Siloxane

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EVLO5A

(U) Effects of Ethylamine Catalyst Concentration in the Precipitation of Reinforcing Silica Filler in an Elastomeric Network.

84

8P

PERSONAL AUTHORS: Mark, J. E.; Ning, Y. P.;

CONTRACT NO. AFOSR-83-0027, NSF-DMR79-18903

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-85-0027

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Bulletin, v12 p413-417 1984.

ABSTRACT: (U) Ethylamine is found to be an effective catalyst for the hydrolysis of tetraethyorthosilicate in the in-situ filling of a polymer network. The silica filler thus precipitated strongly reinforces the elastomer, increasing its modulus, ultimate strength, and rupture energy. Increase in ethylamine concentration increases the rate of filler precipitation, and also increases the ultimate properties at constant weight % filler. Originator furnished keywords include: Hydrolysis of silicates, Reinforced elastomers, Silica precipitation, Silicone elastomers, and Ultimate properties.

DESCRIPTORS: (U) *Chemical precipitation, *Elastomers, *Hydrolysis, *Silicon dioxide, Ethyl radicals, Amines, Reprints, Catalysts, Fillers, Reinforcing materials

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A3

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 408 7/4 20/2 20/12 AD-A150 408 CONTINUED

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Classical Trajectory Study of Adsorption and Surface Diffusion of Si on Si(100).

OCT 84 8P

PERSONAL AUTHORS: Noorbach, I. ; Raff, L. M. ; Thompson, D. L. ;

CONTRACT NO. AFOSR-82-0311

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0030

DESCRIPTORS: (U) *Diffusion, *Absorption, *Silicon,
*Thin films, Activation energy, Trajectories, Diffusion
coefficient, Surfaces, Vapor deposition

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v81
n8 p3715-3721, 15 Oct 84.

ABSTRACT: (U) Adsorption and surface diffusion of silicon on the Si(100) plane have been investigated by classical trajectory methods using a realistic potential-energy surface. The calculated sticking probability for adsorption is 0.985 at 1500 K and is independent of temperature. The diffusion coefficient for Si on Si(100) is evaluated by modeling the diffusion process as the jumping of the adatom from one adsorption site to another. The diffusion coefficient calculated by this approach is given by $D = (6.35 + \text{or} - 1.44) \times 10^{-11} \exp(-3.63 + \text{or} - 0.47 \text{ kcal/mol/RT})$ sq cm/s. This value is found to be in good agreement with the diffusion coefficients calculated from the long-time behavior of the mean square displacement and from the integrated velocity autocorrelation function. The activation energy for diffusion is found to be less than the reported experimental value of 4.6 kcal/mol for the diffusion of Si on Si(111). The diffusion of Si on Si(100) is found to be directional, occurring only along channels described by the intersection of the (022) planes with the (110) plane. Transverse diffusion in directions described by the intersection of the (022) planes with the (100) plane is a much higher-energy process. Originator furnished keywords include: Silicon chemical vapor deposition, Thin films, and Surface diffusion.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 405 7/5 7/4 AD-A150 405 CONTINUED

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Theory of Laser-Simulated Surface Processes.

DEC 84 135P

PERSONAL AUTHORS: George, T. F. ; Lin, J. ; Berl, A. C. ;
Murphy, W. C. ;

REPORT NO. 55

CONTRACT NO. AFOSR-82-0048

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0019

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Progress in Surface Science,
v16 n2 p139-274 Dec 84.

ABSTRACT: (U) Theoretical techniques for describing laser-stimulated processes in a vacuum and at a gas-surface interface are presented. For adspecies-surface systems, the laser excitation of vibrational degrees of freedom is considered, and quantum-mechanical and classical models and also an almost first-principles treatment of the competition between multiphoton absorption and multiphonon relaxation are discussed. The laser excitation of electronic degrees of freedom is considered with respect to surface states of semiconductors and metals, for the predissociation of diatomic species on metal substrates, for ionization, and for resonance fluorescence of a gaseous atom near a metal. In connection with gas-surface interactions, the influence of laser radiation on diffraction patterns and energy transfer in atom-surface scattering is explored. Collisional ionization and ion neutralization in the presence of laser radiation are discussed. The roles of partial pressures and surface coverage in laser-stimulated surface processes are analyzed. Finally, some ideas on surface waves and annealing are presented. Originator furnished keywords include: Review article, Adspecies-surface systems, Desorption and migration, Resonance fluorescence, Surface states and charge

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 404 20/8 12/1

AD-A150 387 12/1 9/2

ROCHESTER UNIV NY DEPT OF CHEMISTRY

MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

(U) A Rule for the Total Number of Topologically Distinct Feynman Diagrams.

DEC 84 5P

(U) Axial Representations of Shape.

DESCRIPTIVE NOTE: Technical rept.,

PERSONAL AUTHORS: Battaglia, F.; George, T. F.;

DEC 84 47P

REPORT NO. 52

PERSONAL AUTHORS: Rosenfeld, A.;

CONTRACT NO. AFOSR-82-0046

REPORT NO. CAR-TR-102, CS-TR-1462

PROJECT NO. 2303

CONTRACT NO. F49620-83-C-0082

TASK NO. A2

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0028

TASK NO. A7

MONITOR: AFOSR
TR-85-0047

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Mathematical Physics, v25 n12 p3489-3491 Dec 84. Errata sheet inserted.

UNCLASSIFIED REPORT

ABSTRACT: (U) A rule for the total number of topologically distinct Feynman diagrams is presented for the ground state of a system of many identical particles interacting via a two-body potential. Keywords include: Feynman diagrams; Topologically distinct; Total number; Ground-state system; Identical particles; Two-body potential.

ABSTRACT: (U) Classes of 'ribbonlike' planar shapes can be defined by specifying an arc, called the spine or axis, and a geometric figure such as a disk or line segment, called the generator, that 'sweeps out' the shape by moving along the spine, changing size as it moves. Shape descriptions of this type have been considered by Blum, Brooks, Brady, and others. This paper considers such descriptions from the standpoints of both generation and recovery (i.e., given a shape generated in this way, to determine the axis and generation rule that gave rise to it), and discusses their relative advantages and disadvantages. Keywords include: Shape; generalized ribbons.

DESCRIPTORS: (U) *Topology, *Particles, *Ground state, Reprints

IDENTIFIERS: (U) *Feynman diagrams, Topologically distinct, Identical particles, Two body potential

DESCRIPTORS: (U) *Character generators, *Planar structures, *Shape, Axes, Geometric forms

IDENTIFIERS: (U) Blum ribbons, WUAFOSR2304A7, PE61102F

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AD-A150 387

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 374

9/1

AD-A150 340

20/2

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Development of a Planar Heterojunction Bipolar
Transistor for Very High Speed Logic.

(U) NMR Study of Polyethylene Crystallization Kinetics
under High Pressure.

DESCRIPTIVE NOTE: Annual technical rept. no. 2, 1 Oct 83-
30 Sep 84,

DESCRIPTIVE NOTE: Rept. for 30 Sep 83-29 Sep 84,
84 14P

NOV 84 51P

PERSONAL AUTHORS: Long, S. I. ;

PERSONAL AUTHORS: Brown, D. R. ; Jonas, J. ;

CONTRACT NO. AFOSR-82-0344

CONTRACT NO. AFOSR-81-0010

PROJECT NO. 2305

PROJECT NO. 2303

TASK NO. C1

TASK NO. A3

MONITOR: AFOSR
TR-84-1236

MONITOR: AFOSR
TR-84-1250

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research project is
to develop heterostructure bipolar transistors for very-
high-speed logic. During the second year of effort,
significant progress was made on (Al,Ga)As/GaAs HBTs of
both emitter-down and emitter-up configurations, with
current gains of 10 or greater being observed in both
cases for base dopings which exceed emitter dopings.
Structural modifications were evaluated which led to
increased injection and reduced recombination currents.
Annealing systems were constructed and characterized for
activation of Be ion-implantations. Promising initial
studies of (In,Ga)P/GaAs HBTs has led to their inclusion
in this research project for the third year of effort.

DESCRIPTORS: (U) *Bipolar transistors, Logic circuits,
High rate, Gallium arsenides, Doping, Emitters, Planar
structures

IDENTIFIERS: (U) *Very high speed logic, PEG1102F,
WUAFOSR2305C1

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UNCLASSIFIED

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SUPPLEMENTARY NOTE: Pub. in Jnl. of Polymer Science:
Polymer Physics Edition, v22 p655-667 1984.

ABSTRACT: (U) Crystallization of polyethylene under
hydrostatic pressures of 1 - 4.5 kbar is directly
observed using pulsed proton NMR. The rate of growth of
extended-chain polyethylene crystals is measured over
this pressure range and to a maximum temperature of 227 C.
The observed crystallization isotherms are superimposable
on a log time scale; this implies a consistent mechanism
for extended-chain growth over this pressure range.
Avrami coefficients for high-pressure extended-chain
crystallization are determined to be 1.3 - 1.7. A
decrease of crystal nucleus surface free energies with
increasing pressure is indicated. Findings are consistent
with Wunderlich's model of initial folded-chain
crystallization followed immediately by chain extension.
Future applications of this NMR technique are briefly
considered. Originator-supplied key words include:
Crystallization, Polyethylene, High pressure, Nuclear
magnetic response.

DESCRIPTORS: (U) *Crystallization, *Polyethylene,
Hydrostatic pressure, Reprints, High pressure, Kinetics,
Isotherms

IDENTIFIERS: (U) WUAFOSR2303A3, PEG1102F

AD-A150 340

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 283 20/10 7/3

AD-A150 282 20/10 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Aspects of Organotin Chemistry.

(U) MNDO Calculations for Compounds Containing Tin,

84

7P

84

5P

PERSONAL AUTHORS: Dewar, M. J. S.; Grady, G. L.; Kuhn, D. R.;
Merz, K. M., Jr;PERSONAL AUTHORS: Dewar, M. J. S.; Grady, G. L.; Stewart, J.
J. P.;

CONTRACT NO. F49620-83-C-0024

CONTRACT NO. F49620-83-C-0024

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B2

TASK NO. B2

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0024

TR-85-0023

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical
Society, v106 n22 p6773-6777 1984.SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical
Society, v106 n22 p6771-6773 1984.

ABSTRACT: (U) MNDO(Modified neglect of differential overlap) has been applied with success to four topics of current interest in organotin chemistry, leading to satisfactory interpretations of the mechanism for hydrostannylation, the structures of sandwich and half-sandwich cyclopentadienyltin compounds, the possibility of multiple bonding by tin in distannene or dimethylmethylenestannane, and the geometry of the trimethylstannyl radical. Originator furnished keywords include: Organotin chemistry.

ABSTRACT: (U) The MNDO (Modified Neglect of Differential Overlap) parametric SCF-MO treatment has been parameterized for tin. Calculations are reported for a number of compounds of tin. The results are comparable with those for the third-period elements. We decided to start with tin, for three reasons: first, because organotin chemistry is not only interesting and varied but is also playing an increasing role in organic synthesis; second, because tin is a metal and MNDO parameters are as yet available for only two metals; and third, as a test of the applicability of the MNDO formalism to elements of later periods. While the results for bromine 14 and iodine 15 were satisfactory, univalent elements cannot exhibit the variety of geometries and types of bonding that polyatomic ones can. Originator furnished keywords include: Compounds containing tin.

DESCRIPTORS: (U) *Quantum theory, *Organometallic compounds, *Tin compounds, Cyclic compounds, Dienes, Methyl radicals, Chemical bonds, Reprints, Sandwich construction

IDENTIFIERS: (U) Hydrostannylation, Tin/cyclopentadienyl, MNDO(Modified Neglect of Differential Overlap), PE61102F, WUAFOSR230382

DESCRIPTORS: (U) *Organometallic compounds, *Quantum theory, *Tin compounds, Computations, Parametric analysis, Reprints

IDENTIFIERS: (U) Organotin, MNDO(Modified Neglect of Differential Overlap), PE61102F, WUAFOSR230382

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OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

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AD-A150 284 12/1

IDENTIFIERS: (U) Dication, MINDO(Modified Intermediate
Neglect of Differential Overlap), PEG1102F, WUAFOSR2303B2

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS

(U) A Concept of Local Observability.

OCT 84 9P

PERSONAL AUTHORS: Sontag, E. D. ;

CONTRACT NO. AFOSR-80-0196

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0050

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters.
v5 n1 p41-47 Oct 84.

ABSTRACT: (U) A notion of local observability, which is
natural in the context of nonlinear input/output
regulation, is introduced. A simple characterization is
provided, a comparison is made with other local nonlinear
observability definitions, and its behavior under
constant-rate sampling is analyzed. Keywords:
Observability; Sampling; Stabilization. (Author)

DESCRIPTORS: (U) *Statistical samples, Input output
processing, Sampling, Reprints

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A6

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 286 7/4 20/5

AD-A150 285 7/3 20/10

ROCHESTER UNIV NY DEPT OF CHEMISTRY

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) How Lasers May Open the Last Frontier of Reaction Dynamics,

(U) The C6R6(2+) (Benzene Dication) System,

NOV 84 5P

84 11P

PERSONAL AUTHORS: George, T. F. ;

PERSONAL AUTHORS: Dewar, M. J. S. ; Holloway, M. K. ;

REPORT NO. 51

CONTRACT NO. F49620-83-C-0024

CONTRACT NO. AFOSR-82-0048

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A2

TASK NO. B2

MONITOR: AFOSR
TR-84-1253

MONITOR: AFOSR
TR-85-0022

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Industrial Chemical News, v5
n11 p23-25 Nov 84.

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical
Society, v106 n22 p8619-8627 1984.

ABSTRACT: (U) A review of experimental results for laser control of chemical reactions is presented, with mention of corresponding theoretical progress. Two general classes of reactions are discussed: gas-phase reactions and reactions occurring at a gas-solid interface. For the first class the following topics are reviewed: state-selected reactions, new reaction pathways and transition-state spectroscopy. For the second class the following topics are reviewed: desorption, chemical vapor deposition, heterogeneous catalysis and microelectronics. Originator furnished keywords include: Review article; State-selected gas-phase reactions; New reaction/Pathways; Transition-state spectroscopy; Reactions at gas-solid interface; Desorption; Chemical vapor deposition; Heterogeneous catalysis; Microelectronics.

DESCRIPTORS: (U) *Chemical reactions, *Laser applications, *Reaction kinetics, Desorption, Gases, Interfaces, Solids, Microelectronics, Vapor deposition, Catalysis, Spectroscopy, Reprints

IDENTIFIERS: (U) WU831303, PE61102F, WUAFOSR2303A2

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ABSTRACT: (U) MNDO(Modified Intermediate Neglect of Differential Overlap)/3 Calculations are reported for the benzene dication (2a), for its hexachloro (2c) hexamethyl (2d), and hexafluoro (2e) derivatives, and for the hexaoxy anion (2b). Two stable isomers were found for 2a, 2c, 2d, and 2e, one corresponding to a symmetrical pentagonal pyramid and the other to a structure similar to that of the chair conformer of cyclohexane. Both isomers of 2a, and both of 2d, have similar energies, each pair being separated by quite a high barrier, while the chair forms of 2c and 2e are the most stable. Planar forms of all five isomers also corresponded to minima on the potential surfaces. Four minima were found for 2b: one a distorted pyramid, one a chair, one planar, and the last a boat, the boat being the most stable. 2a, 2b, and 2d are predicted to have singlet ground states while the triplet chair form of 2c and the triplet planar form of 2e seem to be the most stable. These results agree with experiment and lead to various predictions. MNDO calculations for 2a were less satisfactory. Originator furnished keywords include: (Benzene dication) system.

DESCRIPTORS: (U) *MNDO molecular orbitals, *Cations, *Benzene, Chemical derivatives, Anions, Quantum theory, Reprints, Ground state, Cyclohexanes, Distortion, Pyramids(Geometry), Isomers, Stability

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 289 20/6 7/2

AD-A150 287 20/10 7/3

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Optical Processing in Radon Space.

(U) MNDQ Study of the Claisen Rearrangement,

DESCRIPTIVE NOTE: Final rept. Jul 83-Jul 84,

84

5P

NOV 84 22P

PERSONAL AUTHORS: Dewar, M. J. S.; Healy, E. F.;

CONTRACT NO. AFOSR-82-0249

CONTRACT NO. F49620-83-C-0024

PROJECT NO. 2305

PROJECT NO. 2303

TASK NO. 81

TASK NO. 82

MONITOR: AFOSR

MONITOR: AFOSR
TR-85-0025

TR-84-1287

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v106 n23 p7127-7131 1984.

ABSTRACT: (U) Signals of M dimensions ($M > 1$) can be reduced to one-dimensional data by integration over $M-1$ dimensions. This operation is known as the Radon transform. Many useful two-dimensional signal processing operations can be performed rapidly by first producing the one-dimensional projection data and operating on the projections with efficient one-dimensional processors, such as surface acoustic wave devices. Such operations as spectrum analysis, complex Fourier transformation, production of the Wigner distribution function, and convolution can be performed in this manner, and may be done more rapidly or more accurately than by more conventional methods. Keywords include: Optical data processing; Radon transform; Surface acoustic wave filters.

DESCRIPTORS: (U) *Radon, *Optical processing, Integration, Fourier transformation, Signal processing, Two dimensional, One dimensional, Optical data, Spectrum analysis, Acoustic filters, Surface acoustic waves, Distribution functions

IDENTIFIERS: (U) *Optical data processing, Radon transform

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A150 301 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

AD-A150 301 20/8 7/4

(U) Sequential Excitation Preparation of Molecular Energy Levels with Special Structural and Chemical Properties.

perturbations, Quantum chaos, Anticrossing and Quantum Beat spectroscopy, Barrier to Dissociation, Rotational energy transfer, and Formaldehyde.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-30 Sep 84.

DESCRIPTORS: (U) *Molecular states, *Formaldehyde, *Spectroscopy, *Molecular energy levels, Molecular rotation, Molecular vibration, Molecular structure, collisions, Resonance, Dipole moments, Quantum chemistry, Coriolis effect, Perturbations, Excitation, Preparation, Energy transfer

NOV 84 12P

PERSONAL AUTHORS: Field, R. W.; Kinsey, J. L.;

CONTRACT NO. F49620-83-C-0010

IDENTIFIERS: (U) SEP(Stimulated Emission Pumping), Anticrossing spectroscopy, Quantum beat spectroscopy, WUAFOSR2303B1, PE61102F

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-84-1231

UNCLASSIFIED REPORT

ABSTRACT: (U) This report pertains to: (a) Stimulated Emission Pumping Studies of Formaldehyde. The Stimulated Emission Pumping (SEP) technique was applied for the first time to a polyatomic molecule, H₂CO. SEP spectroscopy has provided an unprecedentedly complete picture of the structure of H₂CO at high levels of excitation. (b) The H₂CO S sub 0 yields H₂+CO Barrier. Stark Quantum Beat and Anticrossing Spectroscopy were used to measure the homogeneous width of two S sub 0 rotation-vibration levels near the top of the S sub 0 barrier. (c) Collisional Studies of H₂CO A 1A sub 1 Level. Two pulsed-cv variants of SEP, Transient Gain and Transient Gain and Transient Polarization Spectroscopy enable measurement of single-J level collisional depopulation and depolarization rates and state-of-state transfer rates free of the multiple-collision effects and limited resolution of resolved fluorescence studies. (d) Spectroscopic Studies of Na₂. Two new techniques were demonstrated. Modulated gain spectroscopy has allowed observation of the levels of Na₂ states near the Na (2S level)+Na(2p level) dissociation limit. Perturbation facilitated Optical-Optical Double Resonance has made the Na₂ triplet valence and Rydberg states accessible to sub-Doppler spectroscopy. Originator furnished keywords include: Spectroscopy, Vibrational structure, Optical-optical double resonance, Molecular dynamics, Anharmonic vibrational constants, Electric dipole moment, Coriolis

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SEARCH CONTROL NO. EVLO5A

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AD-A150 307 20/8 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

CHICAGO UNIV IL JAMES FRANCK INST

(U) The C4H7(+) Potential Surface,

(U) Relaxation of Large Molecules Following Ultrafast Excitation,

84 8P

NOV 84 5P

PERSONAL AUTHORS: Dewar, M. J. S.; Reynolds, C. H.;

PERSONAL AUTHORS: Lorincz, A.; Novak, F. A.; Rice, S. A.;

CONTRACT NO. F49820-83-C-0024

CONTRACT NO. F49820-83-C-0003

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B2

TASK NO. B1

MONITOR: AFOSR
TR-85-0021MONITOR: AFOSR
TR-85-0020

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v106 n21 p6388-6392 1984.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v111 n4,5 p322-325, 9 Nov 84.

ABSTRACT: (U) MINDO(Modified Intermediate Neglect of Differential Overlap)/3 calculations are reported for the C4H7(+) systems. Contrary to conclusions from ab initio calculations but in agreement with experiment, the cyclopropylcarbonyl cation and cyclobutyl cation are both predicted to correspond to minima on the potential surface, the latter being indeed the lower in energy and having a nonclassical structure with a relatively strong transannular bond, corresponding to 1-protonated bicyclobutane. The cyclopropylcarbonyl cation is best formulated as a pi complex. Interconversion of the two isomers was studied and also their conversions to the alpha-methylallyl cation. The formation of 1-substituted 3-butenes does not take place via 3-buten-1-yl cation. Originator furnished keywords include: C4H7(+) potential surface.

DESCRIPTORS: (U) *Cations, *Cyclic compounds, *Propyl radicals, *Butyl radicals, *Quantum theory, Isomers, Surfaces, Methyl radicals, Reprints

IDENTIFIERS: (U) Carbonyl radicals, MINDO(Modified Intermediate Neglect of Differential Overlap), WUAFOSR230382, PE61102F

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ABSTRACT: (U) We demonstrate that the ultrafast relaxation observed in the excited states of large organic molecules in solution may be understood as the coherent evolution of the initially prepared non-stationary state. It is shown that under femto-second excitation conditions the relaxation is determined by the characteristics of the light pulse. The analysis of a simple pump-probe experiment suggests a way of measuring the characteristics of ultrashort pulses. The case of fluorescence excited by ultrafast pulses is also analyzed. Originator furnished keywords include: Vibrational relaxation; Coherent processes; Characterization of ultrashort pulses.

DESCRIPTORS: (U) *Molecular vibration, *Molecular states, Coherence, Fluorescence, Light pulses, Relaxation, Molecules, Organic compounds, Short pulses, Excitation, Reprints

IDENTIFIERS: (U) WUAFOSR230381, PE61102F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A150 310 CONTINUED

AD-A150 309 7/4

DESCRIPTORS: (U) *Ketones, *Photochemical reactions, Isotropism, Photolysis, Solid phases, Absorption, Liquid crystals, Isomers, Cyclic compounds, Butanols, Stearates, Chemical radicals, Reprints

IDENTIFIERS: (U) Smectic phase, Alkyl pherones, Biradicals, WUAFOSR230382, PEG1102F

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DAVEY LAB

(U) Solids Analysis Using Energetic Ion Bombardment and Multiphoton Resonance Ionization with Time-of-Flight Detection.

DESCRIPTIVE NOTE: Technical rept..

DEC 84 13P

PERSONAL AUTHORS: Kimock, F. M. ; Baxter, J. P. ; Pappas, D. L. ; Koblin, P. H. ; Winograd, N. ;

REPORT NO. TR-7

CONTRACT NO. N00014-83-K-0052, AFOSR-82-0057

MONITOR: AFOSR
TR-85-0224

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v56 n14
p2782-2791 Dec 84.

ABSTRACT: (U) Recently multiphoton resonance ionization (MPRI) has been coupled with energetic ion bombardment to yield a highly efficient and selective tool for solids analysis. Although this method promises to yield sub-part-per-billion determinations for many elements without chemical alteration of the matrix, there are a number of experimental factors which may ultimately limit the sensitivity of the technique. Among these factors are (a) duty cycle, (b) primary ion current, (c) sputter yield, (d) useful fraction of ejected particles, and (e) detection efficiency. In this paper we discuss the origin of these factors and their influence on the use of MPRI of sputtered neutrals as a tool for the elemental analysis of solids. Originator furnished key words include: Sputtering, Multiphoton resonance ionization.

DESCRIPTORS: (U) *Ion bombardment, *Solids, *Analytical chemistry, *Photoionization, Ionic current, Sputtering, Neutral, Reprints

IDENTIFIERS: (U) Multiphoton resonance ionization

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SEARCH CONTROL NO. EVL05A

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ray astronomy.

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

DESCRIPTORS: (U) *Detectors, *Gamma rays, Avionics, Astronomy, Germanium, Bismuth compounds, Germanates, Scintillation, Alpha particles, Beta particles, Radiation shielding, Space missions, Signal to noise ratio, Space shuttles

(U) Type II Photochemistry of Ketones in Liquid Crystalline Solvents. The Influence of Ordered Media on Biradical Dynamics.

DESCRIPTIVE NOTE: Rept. for 1981-1983,

IDENTIFIERS: (U) GRAD(Gamma Ray Advanced Detectors), Bismuth germanates, *Gamma ray detectors, Scintillators, Gamma ray astrono, PE81102F, WUAFOSR2309A1

84 8P

PERSONAL AUTHORS: Hrovat, D. A. ; Liu, J. H. ; Turro, N. J. ; Weiss, R. G. ;

CONTRACT NO. AFOSR-81-0013, NSF-CHE81-20730

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-84-1249

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v108 n23 p7033-7037 1984.

ABSTRACT: (U) The Norrish type II photochemistry of five alkylphenones, PhCO(CH₂)_nH (1a, n=4; 1b, n=10; 1c, n=17; 1d, n=19; 1e, n=21), 10-nonadecanone (2), and 2-undecanone (3) was studied in the isotropic, smectic, and solid phases of n-butyl stearate. The ratio of elimination-to-cyclization products for ketones 1c-e and 2 exhibits a strong phase dependence with a 7-8-fold increase in the smectic phase relative to the isotropic phase. The ratio of isomeric cyclobutanols from 2 shows a similar change. Further increases in the elimination-to-cyclization ratio are observed for 1d in the solid phase. The product ratios for ketones 1a, 1b, and 3 are the same in all the phases studied. Transient absorption studies on the intermediate 1,4-biradical produced from laser flash photolysis of 1d yield lifetimes of 64 ± 0.5 and 70 ± 0.5 ns in the isotropic and smectic phases, respectively. These results are explained in terms of the structures of the various phases of n-butyl stearate and the accepted behavior of Norrish type II biradicals. Originator furnished keywords include: Alkylphenones, Norrish type II biradicals, Isotropic phase, Smectic phase.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

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AD-A150 318 18/4

Distribution system theory. PE61102F, WJAROSR2304A1

FLORIDA UNIV GAINESVILLE SPACE ASTRONOMY LAB

(U) Shuttle Flight Test of an Advanced Gamma-Ray Detection System.

DESCRIPTIVE NOTE: Semi-annual technical rept. 1 Jul-31
Dec 83.

FEB 84 21P

PERSONAL AUTHORS: Rester, A. C., Jr;

CONTRACT NO. F49620-83-C-0131, ARPA Order-4585

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-84-1258

UNCLASSIFIED REPORT

ABSTRACT: (U) In August of 1983 the Gamma-Ray Advanced Detector (GRAD) Project was assigned to the AFP-675 Program for flight on a future Space Shuttle mission. In order to adapt the experiment to the requirements of AFP-675 we are making a number of changes, both in hardware and software. However, the necessity for such changes is more than affected by an expansion in scope of the experiment made possible by the introduction of a Payload Specialist into the operation. The principal changes to be made are in the avionics, as GRAD was originally designed for operation through ground-based telemetry. This complete redesigning of our avionics to accommodate operation by a Payload Specialist from the aft flight deck of the Orbiter allows us to take advantage of very recent findings on radiation-induced microprocessor failure in other space shuttle experiments in order to make the GRAD avionics less vulnerable to such latch-ups. Advances in bismuth germanate (BGO) scintillator technology during the year since construction of the prototype GRAD now make it possible for us to construct a BGO shield with a closed-ended geometry. This improvement will enhance the signal-to-noise ratio. In addition we are experimenting with a new type of decay-vetted calibration probe using an alpha-rather than a beta-emitting radioactive source. Keywords include: Gamma-ray detectors, Bismuth germanate, Germanium detectors, Gamma-

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

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PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

CALIFORNIA UNIV LOS ANGELES

(U) Multivariate Analysis and Its Applications.

(U) Approximation in Optimal Control and Identification of Large Space Structures.

DESCRIPTIVE NOTE: Final rept. 15 Dec 81-30 Sep 84.

DESCRIPTIVE NOTE: Final scientific rept. 15 Aug 83-14 Aug 84.

NOV 84 34P

PERSONAL AUTHORS: Krishnaiah, P. R.; Rao, C. R.;

JAN 85 18P

CONTRACT NO. F49820-82-K-0001

PERSONAL AUTHORS: Gibson, J. S.;

PROJECT NO. 2304

CONTRACT NO. AFOSR-83-0317

TASK NO. A5

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0009

TASK NO. A1

MONITOR: AFOSR
TR-85-0049

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of the work done under the contract is reported here. The work involved a broad spectrum of topics in the area of multivariate analysis. These topics include contingency tables, distribution theory, selection of variables, classification and pattern recognition and statistical inference. Keywords include: Multivariate analysis; Reliability; Contingency tables; Multivariate distributions; Selection of variables; Classification & Pattern recognition; and Statistical inference.

DESCRIPTORS: (U) *Multivariate analysis, Classification, Distribution theory, Reliability, Statistical inference, Pattern recognition, Selection, Variables

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A5

UNCLASSIFIED REPORT

ABSTRACT: (U) This project dealt with the application of distributed system theory to control and identification of large flexible space structures. The main analytical tools were control theory for infinite dimensional systems and approximation theory for distributed systems. Both theoretical results and practical numerical approximation schemes were developed. The research dealt with both continuous-time and discrete-time control and identification. In each case, an ideal infinite dimensional compensator was used to guide the design of implementable finite dimensional compensators. Most of the research dealt with optimal linear-quadratic control theory, but significant preliminary results were obtained on infinite dimensional autoregressive-moving-average models of distributed systems. These models will be used in adaptive control and identification of flexible space structures. Subject terms: Control of space structures; distributed system theory; infinite dimensional control theory; approximation theory.

DESCRIPTORS: (U) *Approximation(Mathematics), *Control theory, *Flexible structures, *Spacecraft, Identification, Adaptive control systems, Discrete distribution, Time, Compensators, Optimization

IDENTIFIERS: (U) ARMA(Autoregressive moving average).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A150 325 12/1

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) The Design of a Unified Package for the Solution of Stochastic Petri Net Models.

(U) A Note about the Strong Convergence of the Nonparametric Estimation of a Regression Function.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Technical rept..

84 24P

SEP 84 10P

PERSONAL AUTHORS: Trivedi, K. S. ; Ciardo, G. ; Bobbio, A. ; Dugan, J. B. ;

PERSONAL AUTHORS: Fang, Z. ;

CONTRACT NO. AFOSR-84-0132

REPORT NO. TR-84-45

PROJECT NO. 2304

CONTRACT NO. F49620-82-K-0001

TASK NO. A5

PROJECT NO. 2304

MONITOR: AFOSR TR-85-0013

MONITOR: AFOSR TR-85-0005

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper describes the philosophical differences between three current Stochastic Petri Net models in an attempt to merge the most important (and non-contradictory) aspects into one. It previews the design of a package for the solution of this unified model.

ABSTRACT: (U) Consider the regression model that are unordered design variables, g unknown function defined with mean 0 and finite moment of order p . The asymptotic behavior of estimator g sub n are studied. Keywords include: Nonparametric regression; kernel estimation; large sample property.

DESCRIPTORS: (U) *Stochastic processes, Mathematical models

DESCRIPTORS: (U) *Linear regression analysis, Functions(Mathematics); Convergence, Nonparametric statistics, Estimates

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

AD-A150 328 20/3

AD-A150 327 20/11

RANDOM APPLICATIONS INC MONTROSE CO

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) On Filter Binary Processes.

(U) Dynamic Effects on Fracture.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Final rept. 1 Jul 78-30 Sep 83,

NOV 84

40P

OCT 83

19P

PERSONAL AUTHORS: Pawula, R. F.; Rice, S. O.;

PERSONAL AUTHORS: Achenbach, J. D.;

CONTRACT NO. F49620-83-C-0085

CONTRACT NO. AFOSR-78-3589

PROJECT NO. 2304

PROJECT NO. 2307

TASK NO. A6

TASK NO. B2

MONITOR: AFOSR
TR-85-0055MONITOR: AFOSR
TR-85-0082

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of calculating the probability density function of the output of an RC filter driven by a binary random process with intervals generated by an equilibrium renewal process is studied. New integral equations, closely related to McFadden's original integral equations, are derived, and solved by a matrix approximation method and by iteration. Transformations of the integral equations into differential equations are being investigated. Some numerical results which compare the matrix and iteration solutions with both exact solutions and approximate solutions based upon the Fokker-Planck equation are presented. (Author).

DESCRIPTORS: (U) *Electric filters, Electrical resistance, Capacitance, Output, Fokker Planck equations, Iterations, Solutions(General), Probability density functions, Integral equations

IDENTIFIERS: (U) Binary random processes, RC filters, Equilibrium renewal, PE61102F, WUAFOSR2304A6

ABSTRACT: (U) A summary and a bibliography are presented of the investigations on dynamic effects on fracture in elastic and elastic-plastic materials which were carried out at Northwestern University under the sponsorship of the Air Force Office of Scientific Research during the period July 1, 1978 - September 30, 1983. Two main areas are investigated: high rate loads on bodies containing cracks, and fast fracture and crack arrest. Inertial and crack tip plasticity effects are investigated for a stationary crack under rapid loading. Dynamic analysis of fast fracture and crack arrest using a Dugdale model is formulated and numerically solved. Elastodynamic stress intensity factors are investigated for various subsurface crack geometries, including Mode III analytical solutions and approximate mixed Mode I-II solutions. Elastic-viscoelastic fast fracture and crack arrest are studied using Bodner-Partom constitutive modeling. Crack kinking under stress wave loading is analyzed rigorously for Mode III, and mixed Mode I-II is approximated. Originator furnished key words include: Crack propagation, Near tip fields, Elastic plastic behavior, Crack arrest, Crack kinking.

DESCRIPTORS: (U) *Crack propagation, *Elastic properties, *Plastic properties, *Fracture(Mechanics), High rate, Viscoelasticity, Numerical analysis, Stress concentration

IDENTIFIERS: (U) PE61102F, WUAFOSR2307B2

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NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) Photochemistry of Cyclopentadienylcobalt 1,4-Diaryl tetraazadienes. Examples of C-H, C-F, and C-C Bond Breaking.

84

7P

PERSONAL AUTHORS: Gross, M. E.; Johnson, C. E.; Maroney, M. J.; Troglor, W. C.;

CONTRACT NO. AFOSR-84-0021

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0029

DESCRIPTORS: (U) *Dienes, *Cobalt, *Photolysis, Cyclic compounds, Aryl radicals, Nitrogen, Atomic orbitals, Chemical bonds, Reprints, Cumenes, Solvents

IDENTIFIERS: (U) Dinitrenes, WJAFOSR230382, PE61102F

exist between the photochemical reactions of metal-tetraazadiene complexes and their fragmentation pathways in a mass spectrometer. Originator furnished keywords include: Cyclopentadienylcobalt 1,4-Diaryl tetraazadienes; Photolysis; Metal dinitrene; Metal-tetraazadiene complexes.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v23 n19 p2968-2973 1984.

ABSTRACT: (U) Irradiation of (Eta 5-C5H5)Co(2,4-F2C8H3)N4(2,4-F2C8H3) yields (Eta 5-C5H5)CoN(F2C8H2)N(2,4-F2C8H3) and (Eta 5-C5H5)CoN(F2C8H2)N(2,4-F2C8H3). Photolysis of (Eta 5-C5H5)Co(2,6-(CH3)2C8H3N42,6-(CH3)2C8H3) produces (Eta 5-C5H5)Co(N(CH3)C8H3N2,6-(CH3)2C8H3). These photochemical reactions appear to proceed by expulsion of N2 from the unsaturated CoN4 ring to produce a metal dinitrene, which undergoes a rapid intramolecular rearrangement to yield products that contain a coordinated o-benzoquinone diimine ligand. When (Eta 5-C5H5)Co(2,6-(CH3)2C8H3N42,6-(CH3)2C8H3) is irradiated in cumene solvent, the evolved gas consists of an 0.94:1.0 CH4:N2 mixture. These data are consistent with an aromatic radical substitution process for methyl loss. It is suggested that the transition state necessary for this rearrangement is resonance stabilized, owing to the presence of the cobalt atom and the availability of a low-lying empty nitrogen p(pi) orbital; X alpha calculations of the hypothetical (Eta 5-C5H5)Co(NH)2 species demonstrate the presence of low-lying empty nitrogen p(pi) orbitals in the metal dinitrene. When the ortho substituents are hydrogen, as in (Eta 5-C5H5)Co(C8H5), photolysis of (Eta 5-C5H5)CoN(C8H5) proceeds without the production of H radicals in cumene solvent. Similarities

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AD-A150 338 CONTINUED

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Lattice Filter Parametrization and Modeling of Nonstationary Processes.

coefficients. Keywords include: Lattice filters; parameterization; nonstationary processes; second-order processes; tapped-delay.

JAN 84 17P

DESCRIPTORS: (U) *Mathematical filters, Matrices(Mathematics), Reprints, Parametric analysis, Stationary, Covariance

PERSONAL AUTHORS: Lev-Ari, H.; Kailath, T. ;

IDENTIFIERS: (U) Lattice filters, WUAFOSR2304A8, PE61102F

CONTRACT NO. DAAG29-81-K-0057, AFOSR-83-0228

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, ARO
TR-84-1266, 16946.65-MA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, VIT-30 n1 p2-18 Jan 84. Also available as ARO-18133.32-EL.

ABSTRACT: (U) A general theory of constant-parameter modular lattice models for discrete-time nonstationary second-order processes in terms of Schur and congruence coefficients is derived by developing a natural connection between the displacement structure of a covariance matrix and Schur's test for positive-definiteness of matrices. Schur coefficients provide a simple solution to problems of covariance extension and rational spectral approximation for nonstationary covariances, and they coincide with the well-known reflection (or PARCOR) coefficients when the covariance is stationary. The congruence coefficients provide the time-varying gains of a tapped-delay-line realization of the whitening filter for the process. A constant-parameter realization of the same filter is derived by combining a lattice filter structure with a tapped delay line, both with time-invariant gains. This configuration also provides a recursive relation for the congruence coefficients (namely, a generalized Levinson-Szegö recursion). The tapped-delay-line part of the realization can be eliminated by introducing the concept of admissibility. Admissibility also reduces the parameterization of a nonstationary process to Schur coefficients alone, in analogy to stationary processes, which are completely characterized by their PARCOR

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

AD-A150 198 8/11

SAINT LOUIS UNIV MO DEPT OF EARTH AND ATMOSPHERIC
SCIENCES

(U) Attenuation of Seismic Waves at Regional Distances.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 82-30 Sep
84,

NOV 84 132P

PERSONAL AUTHORS: Nutt11, O. W. ; Mitchell, B. J. ;

CONTRACT NO. F49620-83-C-0015, ARPA Order-4397

MONITOR: AFOSR
TR-84-1272

UNCLASSIFIED REPORT

ABSTRACT: (U) The coda-Q method was applied to determine the anelastic attenuation of 1-sec period Lg waves at NTS(Nevada Test Site), East Kazakh, the Indian subcontinent, and the South American continent. Mb(Lg) m sub b (Lg) versus explosion yield calibration curves are given for NTS explosions in hard rock and in alluvium. The NTS hard-rock calibration curve, when applied to explosions in other regions of the United States and in the French Sahara, gives realistic yield estimates. The technique also is applied to selected Soviet explosions in East Kazakh. M sub b (Lg) and M sub b (P) values were used to estimate the M sub b (P) bias between NTS and eastern North America. Assuming that explosions and earthquakes of the same M sub b (P) value excite Lg waves of equal amplitude, the P-wave magnitude bias between NTS and eastern North America. Assuming that explosions and earthquakes of the same M sub b (P) value excite Lg waves of equal amplitude, the P-wave magnitude bias between NTS and eastern North America is 0.31 magnitude units. A tentative value for the bias between NTS and Shagan River is 0.41 magnitude units, but this value may be changed. Frequency-dependence of crustal Q seems significant in regions of high Q, but are small or non-existent in regions of low Q values. Keywords include: Lg waves, Magnitude, Surface waves, Spectra, Nuclear explosions, and Seismic yield.

DESCRIPTORS: (U) *Seismic data, *Rock, *Seismic waves, South America, Range(Distance), Bias, Excitation, Primary waves(Seismic waves), Statistical analysis, Alluvium,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLO5A

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AD-A150 193 12/1

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Research in the Optical Sciences.

(U) Schur-Ostrowski Theorems for Functionals on $L(0,1)$.

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-30 Sep 84.

DESCRIPTIVE NOTE: Technical rept..

OCT 84 87P

AUG 84 29P

PERSONAL AUTHORS: Shannon, R. R. ;

PERSONAL AUTHORS: Chan, W. ; Proschan, F. ; Sethuraman, J. ;

CONTRACT NO. F49620-80-C-0022, MIPR-ARO-103-83

REPORT NO. FSU-STATISTICS-M684, TR-D-69-ARO

MONITOR: ARO, AFOSR
15412.20-PH, TR-85-0132

CONTRACT NO. F49620-82-K-0007, DAAG29-82-K-0188

PROJECT NO. 2304

UNCLASSIFIED REPORT

TASK NO. A5

ABSTRACT: (U) Research during the fifth year of contract F49620-80-C-0022 is described. Discussed are: optical bistability in thin evaporated films; long-range surface-plasmon polaritons; nonlinear guided wave interactions; theory of two-photon Doppler-free spectroscopy; x-ray image intensifiers with electronic readout; optical bistability; optical bistability experiments to improve solid-state devices and basic understanding; modulated emittance spectroscopy; high-resolution wavefront sensing through the atmosphere; aberrated Gaussian beams; ion beam processing of optical coatings on plastics; optical coatings for the x-ray to ultraviolet wavelength range. The degrees awarded to students receiving JSEP support are listed. Also included are the papers published under JSEP support from 1979 to 1983. Originator-supplied keywords include: Optics, and Optical sciences.

DESCRIPTORS: (U) *Optics, Optical properties, Stability, Thin films, Plasmons, Ultraviolet spectra, Research management, Detection, High resolution, Wavefronts, Spectroscopy, Optical coatings, Ion beams, Processing, Solid state electronics, Image intensifiers(Electronics)

IDENTIFIERS: (U) Polaritons

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MONITOR: AFOSR, ARO
TR-84-1245, 19367.21-MA

SUPPLEMENTARY NOTE: Also available as Rept. no. TR-84-171-AFOSR.

ABSTRACT: (U) Hardy, Littlewood and Polya (1934) introduced the partial ordering of majorization among n -dimensional real vectors. Many well known inequalities can be recast as the statement that certain functions are increasing with respect to this ordering. Such functions are said to be Schur-convex. An important result in the theory of majorization is the Schur-Ostrowski Theorem, which characterizes Schur-convex functions. The concept of majorization has been extended to elements of L sub $(0,1)$ by Ryff (1983). A functional on L sub $(0,1)$ that is increasing with respect to the ordering of majorization is said to be Schur-convex. In this paper, the authors prove an analogue of the Schur-Ostrowski condition which characterizes Schur-convex functionals in terms of their Gateaux differentials. They also introduce another partial ordering in L sub $(0,1)$ called unrestricted majorization. This partial ordering is similar to majorization but does not involve the use of decreasing rearrangements. The authors establish a characterization of non-decreasing functionals on $L(0,1)$ with respect to the partial ordering of unrestricted majorization through another analogue of the Schur-Ostrowski condition. Keywords include: Inequalities;

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVL05A

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majorization; Muirhead's theorem; peakedness in symmetric distribution; rearrangement; Schur functions; Schur-Ostrowski's theorem.

DESCRIPTORS: (U) *Functional analysis, Theorems

IDENTIFIERS: (U) Schur functions, Schur-Ostrowski theorems. WUAFOSR2304A5, PE60112F

AD-A150 169 9/2 14/4

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Optimal Allocation of Components in Parallel-Series and Series-Parallel Systems.

DESCRIPTIVE NOTE: Technical rept..

NOV 84 32P

PERSONAL AUTHORS: El-Newehi, E. ; Proschan, F. ; Sethuraman, J. ;

REPORT NO. FSU-TR-M690, TR-D-73-ARO

CONTRACT NO. DAAG29-82-K-0188, AFOSR-80-0170

MONITOR: ARO, AFOSR
19387.22-MA, TR-84-173

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Illinois Univ. Chicago, IL. Dept. of Mathematics. Sponsored in part by Grant AFOSR-82-K-0007.

ABSTRACT: (U) This paper considers the problem of optimal allocation of components to parallel-series and series-parallel systems to maximize the reliability of the system or the expected number of working subsystems. For parallel-series systems the optimal allocation is completely described and it depends only on the ordering of component reliabilities. For series-parallel systems, we describe a partial ordering among allocations that can lead to the optimal allocation. The powerful techniques of Schur functions are used to obtain these results. Finally, we describe how these problems can be cast as integer linear programming problems and therefore can also be attacked by other methods. Keywords include: Reliability; Optimal allocation; Schur functions; Integer programming.

DESCRIPTORS: (U) *Parallel processors, *Serial processors, *Reliability, *Systems engineering, Allocations, Computer programming, Integer programming, Linear programming, Optimization

IDENTIFIERS: (U) Schier Functions

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BATTELLE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Electrical and Thermal Transport Property Studies of High-Temperature Thermoelectric Materials.

Electrical properties. Microstructure, Thermal conductivity

IDENTIFIERS: (U) High temperature thermoelectric materials

DESCRIPTIVE NOTE: Interim rept. 15 Aug 83-15 May 84.

JUL 84 105P

PERSONAL AUTHORS: Bates, J. L. ; Garnier, J. E. ; Olsen, L. C. ; Griffin, C. W. ;

CONTRACT NO. F49620-83-C-0109

MONITOR: AFOSR
TR-84-1210

UNCLASSIFIED REPORT

ABSTRACT: (U) The first year of this research emphasized the study of electronically conducting oxides with varied transport characteristics, an evaluation of theoretical models, and the determination of a high-temperature transport property data base. Oxide systems based on SnO₂-In₂O₃, (La, Y) (Mg, Ca, Sr) CrO₃, HfO₂-R₂Oy-In₂O₃ and La(Sr) MnO₃ were selected for initial studies and represent different crystallographic/defect structures and transport characteristics. The electrical conductivity, Seebeck coefficient and thermal conductivity for these oxides are being measured and have provided a preliminary data base for evaluating transport properties and the figure of merit. The purpose of this report is to describe the technical results obtained during the first year's study of high-temperature thermoelectric materials. The scope of the research is (a) to develop theoretical models for electrical, thermal, and thermoelectric behavior of refractory oxide materials, (b) to determine electrical transport properties necessary to develop and test these models, (c) to determine methods for increasing the figure of merit in refractory oxide systems by varying composition, defect structure, microstructure, etc., and (d) to use these models to establish theoretical and empirical limits of the figure of merit for these oxides and other refractory materials.

DESCRIPTORS: (U) *Electrical properties, *Refractory materials, *Transport properties, *Oxides, *Thermal properties, Crystal defects, Electrical conductivity, High temperature, Thermoelectricity, Data bases,

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AD-A150 144 21/2 20/4 21/4

COLORADO UNIV AT BOULDER

SHEFFIELD UNIV (ENGLAND) DEPT OF CHEMICAL ENGINEERING
AND FUEL TECHNOLOGY

(U) Ion Transport in Beam-Plasma Interactions.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 83-30 Sep 84.

(U) Coherent Structures in Turbulent Flames.

DESCRIPTIVE NOTE: Final rept.,

SEP 84 8P

OCT 83 32P

PERSONAL AUTHORS: Stern, R. A. ;

PERSONAL AUTHORS: Chigier, N. A. ;

REPORT NO. 153-3223

CONTRACT NO. AFOSR-83-0325

CONTRACT NO. AFOSR-77-3414

PROJECT NO. 2310

MONITOR: AFOSR

TR-84-1275

TASK NO. A7

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-84-1257

UNCLASSIFIED REPORT

ABSTRACT: (U) This interim report covers work performed on the topic of laser-fluorescence measurements of ion beam scattering and transport of background ions during beam-plasma interactions. Achievements to date include (1) construction and operation of the plasma device, (2) assembly of a diagnostic pulsed laser, and (3) assembly and emplacement of the detection system. Future work plans, personnel changes and general scientific activities are described. Originator furnished keywords include: Ion beams, Beam-plasma interactions, Plasmas, Diagnostics, Laser diagnostics, Ion transport, and Beam scattering in plasmas.

DESCRIPTORS: (U) *Ion ion interactions, *Ion beams, *Ion exchange, *Plasmas(Physics), Plasma diagnostics, Scattering, Beams(Radiation), Pulsed lasers

IDENTIFIERS: (U) *Beam plasma interactions, Laser diagnostics, Beam scattering, WUAFOSR2310A7, PEB1102F

ABSTRACT: (U) The objective of this research was to obtain increased understanding of turbulent combustion in flows related to propulsion systems. Measurement and data analysis techniques, and the boundary conditions of various flames were designed to provide improved concepts and fundamental experimental data, to aid the development of modelling techniques for practical combustion systems. The specific approach of the study was to quantify the roles of large eddies (coherent structures) in reacting flows. The experiments and measurement techniques which have been developed to attain this aim were described in previous Interim Scientific Reports. Measurements during the past year have been made in the initial region of gaseous jet flames with separate variation in Reynolds number and equivalence ratio. These measurements have produced detailed data on the structure of the initial regions of jet diffusion flames, as a function of systematic variation of initial burner nozzle conditions. This data is already recognized to be of considerable use for combustion modelling. Two associated experiments, investigating the structures of turbulent liquid fuel sprays and impinging flames have been carried out during the period of the contract.

DESCRIPTORS: (U) *Turbulent flow, *Flames, *Fuel sprays, Boundary layer flow, Experimental data, Coherence, Impingement, Eddies(Fluid mechanics), Burners, Nozzles, Combustion, Jet flames, Diffusion, Measurement, Propulsion systems, Liquids

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SAINT LOUIS UNIV MO DEPT OF EARTH AND ATMOSPHERIC SCIENCES

scatterers, Coda Q, Seismic scattering, Synthetic seismograms, Shear waves

(U) Lg Wave Excitation and Propagation with Application to Nuclear Yield Determination.

DESCRIPTIVE NOTE: Semi-annual rept. no. 3, 1 Apr-31 Oct 84.

NOV 84 99P

PERSONAL AUTHORS: Herrmann, R. B.; Wang, C. Y.;

CONTRACT NO. F49620-83-C-0087, ARPA Order-4751

MONITOR: AFOSR
TR-84-1271

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of seismic wave propagation in heterogeneous media are continued. A detailed study of the Cerveny-Psencik ray tracing program SEIS81 is made by comparing results to those obtained by full wavenumber integration and Cagniard-de Hoop techniques. Programming errors were detected in the subroutines AMPL and COEF8 which led to incorrect amplitudes of free surface reflections of shear waves. These errors are present in SEIS83 and in other programs which uses these routines. The other result obtained consists of initial formulation and testing of algorithms for deterministic scattering of surface waves by point scatterers. Initial results are promising, yielding qualitative agreement with observed data. First order scattering theory can be made to fit onto small minicomputers. Initial results point out the importance of the source-scatterer-receiver distance, mode conversion and wavetype conversion. Keywords include: Lg coda; Coda Q; Seismic wave scattering; Synthetic seismograms.

DESCRIPTORS: (U) *Seismic waves, Amplitude, Seismic reflection, Secondary waves, Algorithms, Theory, Heterogeneity, Determination, Yield(Nuclear explosions), Computer programming, Errors, Wave propagation, Determinants(Mathematics), Conversion, Scattering, Shear properties, Subroutines, Seismic data, Synthesis, Minicomputers, Surface waves

IDENTIFIERS: (U) Lg Coda, SEIS81 computer program, Point

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